FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 105
No. 2186

SEPTEMBER 4, 1958

Registered at the G.P.O. as a Newspaper

Offices: John Adam House, John Adam St., London, W.C.2

Single Copy, 1/-. By Post 1/4. Annual Subscription, Home 52/-, Abroad 60/- (Prepaid)

UNIVERSITY OF MICHIGAN
SEP 21 1958

Thousands of man-hours lost

through industrial accidents—

—which adequate protective equipment could easily prevent

Protective Clothing and Equipment stocked by the T.W.W. Foundry Supplies Department includes: Goggles, Face Screens, Helmets and Shields, Respirators, Hoods, Aprons, Gloves, Mitts and Gauntlets, Asbestos Safety Clothing, etc.

Write for a copy of the Industrial Protection Equipment catalogue illustrated below.

THOS. W. WARD LTD

ALBION WORKS, SHEFFIELD

FS31

NO. 10 PREPARED BLACKING

PHŒNIX

BLACKING or PLUMBAGO MIXTURE for the CO_2 process

STEELMOL *for STEEL and SPECIAL IRON CASTINGS*

HIGH CARBON BLACKING · CEYLON PLUMBAGO
TERRA FLAKE · COAL DUST · GANISTER AND
"ALUMISH" FOR ALUMINIUM
Non-Silica PARTING POWDER

JAMES DURRANS & SONS LTD

PHŒNIX WORKS & PLUMPTON MILLS · PENISTONE · near SHEFFIELD
Telephone: PENISTONE 3121 and 3122 *Telegrams*: BLACKING, PENISTONE

FOUNDRY TRADE JOURNAL

Vol 105. September 4, 1958 No. 2186

Established 1902

Incorporating

IRON & STEEL TRADES JOURNAL

Single copy 1s.; *by post* 1s. 4d.

Annual subscription: home 52s., *abroad* 60s. *(prepaid)*

Editor:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

Assistant Editor: A. R. PARKES, M.I.B.F.

Commercial Editor P. E. CARDEN.

Advertising Manager: F. BARRINGTON HOOPER, B.A.

Production Manager: R. J. LOVELL

Publisher: H. J. DWYER

Circulation Manager: E. T. GRIFFITHS

District Representatives:
G. P. ELLIOTT (Northern Area)
T. H. SMITH (Scotland)

The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Every Thursday by Industrial Newspapers, Limited

BARRINGTON HOOPER, C.B.E., *Chairman and Joint Managing Director*

F. BARRINGTON HOOPER, B.A., *Joint Managing Director and Commercial Director*

F. R. LEWIS, JOHN HOOPER, D. HORN *Directors*

E. G. WESTON, *Director and Secretary*

JOHN ADAM HOUSE, 17-19, JOHN ADAM STREET, ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 *(Private Branch Exchange)*
Telegraphic Address: "Zacatecas, Rand, London."

PRINCIPAL CONTENTS

Page

Survey of Belgian Foundries I: Compagnie Generale des Conduits d'Eau

This account of the works of the company in Les Vennes, Liège, refers briefly to the major features of the foundries to be seen there, and to different aspects of the company's production methods 281

Survey of Belgian Foundries II: Fabrique Nationale D'Armes de Guerre, S.A.

An account of the patternshop and non-ferrous foundries and other facilities of the company at Herstal, Liège. The article includes illustrations of foundry processes and of typical castings made .. 287

Mercury-arc Converters for Induction Heating

By T. A. Cosh, B.Sc., A.R.C.S.T., F.I.M.

Recent developments in the application of grid control to mercury-arc rectifiers as an alternative to motor/generators as power sources for high-frequency electric melting furnaces are discussed 291

Babbitting of Cast Iron

Improved preparatory methods at Phosphor Bronze Company, Limited 295

Standards for Resin-coated Sand 297

By F. Le Serve

Visite à la Compagnie Générale des Conduites d'Eau.
Un compte-rendu des ateliers de la Compagnie Générale des Conduites d'Eau à Les Vennes, Liège, décrit brièvement les principales caractéristiques remarquées dans cette fonderie et les differents aspects des méthodes de production de cette compagnie. 281

Fabrique Nationale d'Armes de Guerre, S.A.
Un compte-rendu de la menuiserie de modèles, des fonderies de fonte et non-ferreux et autres facilités de la Fabrique Nationale d'Armes de Guerre, S.A. à Herstal, Liège. Cet article comprend des illustrations des procédés de fonderie et de pièces coulées typiques de cette usine. 287

Convertisseurs à Arc de Mercure pour Chauffage par Induction. Par T. A. Cosh, B.Sc., A.R.C.S.T.. F.I.M.
Recents developpements utilisant le contrôle électrique des redresseurs à arc de mercure comme alternative des moteurs-générateurs en temps que source d'énergie pour les fours éléctriques de haute-fréquence. 291

Méthode pour garnir la Fonte de Métal blanc. 295

Définition d'une Norme pour Sables Couverts de Résine. Par F. Le Serve. 297

Besuch bei der Compagnie Gén rale des Conduites d'Eau.
Dieser Bericht über die Werke dieses Unternehmens für Wasserleitungsanlagen in Les Vennes bei Lüttich, beschreibt kurz die Hauptmerkmale der dort zu sehenden Giessereien und die verschiedenen Herstellungsmethoden für das Produktionsprogramm dieser Firma. 281

Fabrique Nationale d'Armes de Guerre, S.A.
Bericht über die Modelltischlerei, die Eisen-und Metaligiessereien und andere Einrichtungen der Nationalen Belgischen Waffenfabriken in Herstal, Lüttich. Der Artikel bringt Abbildungen von Vorgängen in der Giesserei und von einigen für diese Giesserei typischen Guss-stücken. 287

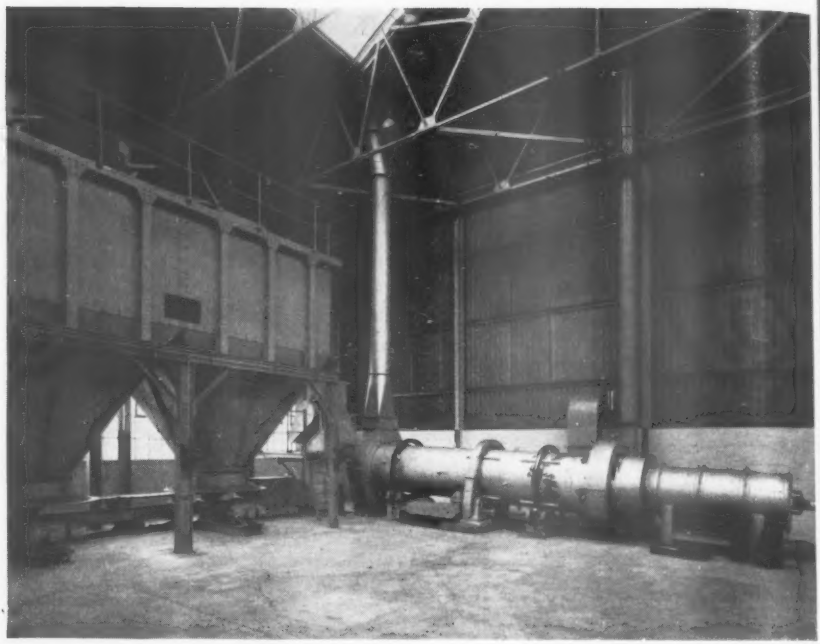
Quecksilber-Lichtbogenumformer für Induktionsheizung.
Von T. A. Cosh, B.Sc., A.R.C.S.T., F.I.M.
Neuere Entwicklungen der Anwendung elektrischer Steuerung auf Quecksilber-Lichtbogengleichrichter an Stelle der Verwendung von Motorgeneratoren als Energiequelle für elektrische Hochfrequenz-Schmelzöfen. 291

Ausgiessen von Gusseisen mit Lagerweissmetall. 295

Aufstellung einer Norm für mit Kunstharz überzogene Sande. Von F. Le Serve. 297

Features, News, Commercial Information and Statistics

Leader: Foundry Exhibition, 1959 .. 279
Purchasing Officers' Association .. 280
Iron and Steel Institute .. 280
Steel-melting Furnace exported to Canada .. 280
Where Do They Go? .. 286
The Dragon Sells British Equipment .. 286
Equipment and Supplies .. 294
Family's 225 Years in Brass Founding .. 299
News in Brief .. 300
Publications Received .. 301
Personal .. 302
Company News .. 304
Raw Material Markets .. 306
Current Prices of Iron, Steel and Non-Ferrous Metals .. 308



Photograph published by courtesy of The Hill Top Foundry Co. Limited, Wednesbury

for Complete Efficiency..

August's LIMITED

FOUNDRY LAYOUT

Photograph shows:

A section of the Core Shop Plant in a Large Ironfoundry. Two large Rotary Storage Hoppers feed the Wet Sand on to a Belt Conveyor and then to a Belt and Bucket Elevator to the Gas Fired Rotary Sand Drier. The dried Sand is then Pneumatically conveyed to Large Storage Hoppers in the Mixing Section.

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

AUGUST'S LIMITED · HALIFAX · ENGLAND

Telephone: HALIFAX 61245/6/7/8 Telegrams: AUGUST, HALIFAX

J.J.M.

FOUNDRY
TRADE JOURNAL

Vol. 105 SEPTEMBER 4, 1958 No. 2186

Foundry Exhibition 1959

It is only just over a month ago since we announced the Foundry Exhibition which is to be held at Bingley Hall, Birmingham, from May 21 to 30 next year, yet it is now possible to state that its success is assured. A very high percentage of the space has now been let, and firms desiring to be represented are strongly advised immediately to make application to the organizers—Herbert Daniel Exhibitions, 3, Clifford Street, London, W.1. Excluding international and the American biennial shows, which, after all, cater for a continent, this exhibition will be the largest purely national one ever staged. This statement requires clarification and it should not be taken to mean that foreign exhibits are to be excluded. It is intended to convey that it is already predominantly British.

The three leading foundry employers' associations have been offered space which it is hoped will be used for the encouragement of apprentice training, by showing what is being done, by exhibits of their work and by showing the boys actually operating a miniature foundry. From the list of exhibitors which has already been printed and from others since received, it can be stated without reservation that the exhibition will be a true cross-section of all that the foundry equipment industry has to offer by way of modern production methods. The supplies section, too, is exceptionally well represented. It is insufficiently realized that between them, the equipment and supply firms employ imposing staffs of chemists, metallurgists and technologists, who not only ensure the quality and consistency of the goods they make, but give an advisory service of a very high order.

As admission to the exhibition is by invitation only, and whilst the Foundry Trades Equipment and Supplies Association can be relied upon to give pretty full coverage, yet, if nearer the time some foundry executive fails to receive one, he should apply to the secretary of the Association. This particularly applies to overseas readers who, we can assure, even at this early stage, will receive a hearty welcome and will have every facility placed at their disposal for meeting their individual wishes. To-day, there is a realization amongst buyers that British foundry equipment and supplies rank very high in the international market. This year, there were two important factors. The new Thames Foundry at Ford's was equipped with nearly 100 per cent. British-made plant and the British exhibits at the Cleveland, Ohio, show were highly esteemed.

£4,000,000 Oil Equipment Order for UK

In the face of strong French, German, and Italian competition, "Brefcon," a consortium of British oil equipment manufacturers, has been awarded a contract for the supply of a minimum of £4,000,000 worth of equipment for a new refinery to be built near Rio de Janeiro for Petrobas, the Brazilian Government oil monopoly.

Members of Brefcon, which was formed under the aegis of the Council of British Manufacturers of Petroleum Equipment, are:—Babcock & Wilcox, Limited; British Thomson-Houston Export Company, Limited; Stewarts and Lloyds, Limited, and John Thompson, Limited. Balfour, Beatty & Company, Limited, acts in a secretarial and co-ordinating capacity.

Another British company, Foster, Wheeler, Limited, superheater manufacturers, of Egham (Surrey), is retained by Petrobras for the design, engineering, and supervision of the refinery.

The contract follows on the recent visit by representatives of the British companies to Brazil at the invitation of Petrobas.

Iron and Steel Institute

The 37th meeting of the Iron and Steel Engineers' Group will be held in Blossoms Hotel, Chester, from Tuesday to Thursday, October 14 to 16. Mr. F. B. George, chairman of the Group, will preside; the meeting will commence on the Tuesday afternoon and end at mid-day on the Thursday. The programme will include the presentation and discussion of papers on crane safety and on the design (including aspects of ergonomics) of steels works overhead cranes. A visit will be paid to the Irlam Works of the Lancashire Steel Manufacturing Company, Limited, by kind invitation of the company; there will also be a dinner in Chester at which members will again be the guests of the company. Details of the meeting are available from the secretary of the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1.

National Society of Master Patternmakers

The 1958-59 programme of the National Society of Master Patternmakers is to commence on September 24 with a works visit, arranged by Shell Mex & B.P., Limited, to the British Petroleum Refinery at the Isle of Grain. The assembly point will be Shell-Mex House, Strand, London, W.C.2, at 9 a.m., for departure to the Refinery at 9.30 a.m. Arrival at the Refinery is scheduled for 10.45 a.m. and the visit will end at 4.45 p.m., the party arriving back at Shell-Mex House at 6 p.m. The number of participants is restricted to 30, and members will be given preference, but should this maximum not be reached then members' ladies will be welcome to take part in the visit. Applications to attend should reach the secretaries, Fisher & Firkins, 12, Cherry Street, Birmingham, 2, not later than September 10.

Mr. C. F. WIDMER left the UK this week for Israel, where he is to act as consultant for the setting up of a precision-investment section at Vulcan Foundries, of Haifa, in accordance with the agreement recently concluded with Shaw Processes, Limited. Mr. Widmer expects to be in Israel for at least three months.

Purchasing Officers' Association

Conference and Minibition

The annual conference and Minibition of the Purchasing Officers' Association will be held at Cambridge Hall and Atkinson Art Gallery, Southport, from October 2 to 5. The growing recognition in industry that the purchasing officer has a major part to play in the fight against inflation has influenced the shape of the business programme of this year's conference. Beginning with an economic analysis of the "Behaviour of Prices," by Professor A. D. Campbell, of Queen's College, Dundee, and followed by the practical considerations involved in the "Purchasing Element in Constructional and Engineering Contracts," an address by Mr. J. Murray Grammer, Director-General of Purchasing and Stores, National Coal Board, there will then be a discussion between Mr. R. Bertrand, head of the "Countries Studies Division" of OEEC, and Mr. J. H. M. Pinder, managing Editor, the Economist intelligence unit, on the "Purchasing Outlook in Europe."

Once again, over 100 firms have booked stands for the Minibition. The best displays will be selected by a judging panel, headed by Sir Gordon Russell, C.B.E., M.C., R.D.I., F.S.I., director of the Council of Industrial Design.

Steel-melting Furnace Exported to Canada

The first of two 40-ton G.W.B.-Leone Tagliaferri electric direct-arc steel-melting furnaces were recently shipped to Canada for delivery to the Canadian Steel Wheel Company, Montreal. The largest item for shipment comprised the actual furnace shell which weighed over 50 tons. This presented quite a problem since, owing to its size, it could not be brought by road transport direct to the side of the Birmingham City which was moored at Cardiff docks. Accordingly, the furnace shell was brought to the only point accessible, and was then carried to the Birmingham City by means of a floating crane. The rest of the equipment was brought in the normal manner to the side of the ship for loading. This furnace represents the first half of a 500,000 dollar order, the second furnace being due for shipment at the beginning of October so that it can reach Montreal in time before the St. Lawrence freezes over.

Fire Prevention

In a Press release from Colt Ventilation, Limited, Surbiton, Surrey, announcing their participation at the Fire Exhibition to be held at Torquay from September 29 to October 3, there is included an interesting diagram covering a single-storey building. This shows that by roof ventilation the accumulation of smoke and heat is prevented and the fire localized and made more easily approachable by firemen. Yet, there was once printed in this JOURNAL an article, received from an official source, covering pattern stores. In it, it was advocated that a building should have no windows, and be more or less air tight, so that through the absence of oxygen any fire would not spread. Maybe a pattern store is a special case.

STEEL EXPORTERS' COMMISSION is to be cut by the Ruhr steel industry from 5.5 per cent. to 3.5 per cent. It is claimed that part of that commission has, in many instances, been transformed into a price rebate and thus contributed to undercutting.

*Survey of Belgian Foundries, I.**

Compagnie Generale des Conduites d'Eau

In the following account of the works of the Compagnie Generale des Conduites d'Eau in the district of Liège known as Les Vennes, the mechanized and jobbing foundries are described and illustrated and mention is made too of the brass and bronze foundry and of the projected steel foundry. Among features of particular interest to be seen at the company's works is the pilot melting plant. Allusion to this and to the foundry museum created by the Doat family, which has long been connected with Compagnie Generale des Conduites d'Eau, concludes the account.

The district of Liège in which the Compagnie Generale des Conduites d'Eau is located has been known for hundreds of years as Les Vennes, and here, since 1548, metallurgy has been practised. The company grew out of earlier concerns and was registered as a limited liability company in 1865, with the object of supplying water mains. This is still a very important activity and since 1923, they have been manufactured by the de Lavand centrifugal process. Other major lines of production are water meters, valves, pipe specials and related apparatus. At the time of the visit here described, a large order for economizer castings was on hand, the metal pattern for which was made in the company's own shops and was of the highest quality. This day was the Monday of a "Safety First" week and for an hour the whole works was closed down for a "pep" talk. All the danger points in the works had been painted in accordance with standard practice. In one place, there was an exhibit of moulders' boots and goggles, side by side with a white walking stick and a crutch. The works employ about 1,000 operators and is served by three foundries.

Centrifugal Cast Pipe Foundry

In this foundry are nine centrifugal casting machines similar in design to those operating at Stanton, Pont à Mousson and Gelsenkirchen. Here, pipes are made ranging in diameter from 2 in. to 24 in. The cores are made on a blowing machine (Fig. 1) supplied by the Constructional Engineering Company, Limited. A view of the shop is shown on page 282. Metal is provided by a MBC cupola which was pioneered in this plant. It has been fully described in the JOURNAL and now operates continuously for five weeks without repair to the carbon paste lining. Its production is of the order of 2,000 tons per month, made from all scrap charges. Not all goes into pipes, for the mechanized and jobbing foundries take about 500 tons a month, whilst a further quantity is pigged. Cold-blast cupolas have been retained in both foundries as stand-by plants. Very good Belgian coke, with only seven per cent. ash, is available as fuel. The MBC plant is magnificently instrumented and every detail of working is automatically registered. The metal is cast into a receiver, shown on page 282 and samples from it reach, and the results return, from the laboratory to the plant by a pneumatic tube.

Mechanized and Jobbing Foundry

Metal from the MBC cupola reaches this foundry in four-ton ladles through a tunnel. There is a temperature drop of the order of 40 deg. C. from the spout temperature. It is brought back to a suitable casting temperature in one of two three-ton 400 kva. mains-frequency furnaces. This ensures a supply

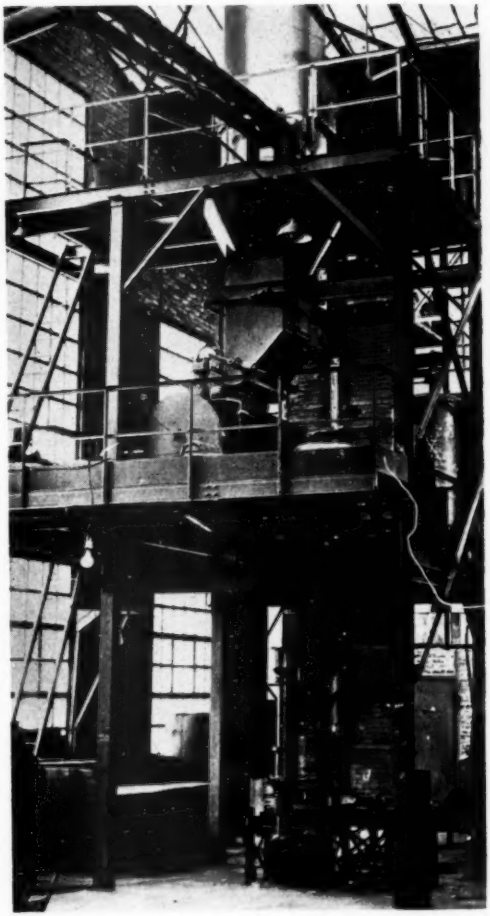
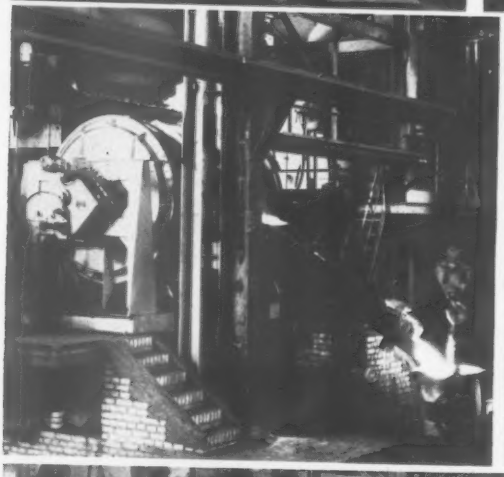


FIG. 1.—*Coreblowing machine which makes the cores for the spigot ends of the centrifugal cast pipes.*

* Establishments to be visited during the 1958 International Foundry Congress.



The group (Figs. 2 to 7) on the facing page show: Top row (left) one of the centrifugal pipe-casting machines installed in the works of Conduites d'Eau; (right) a corner of the centrifugal cast pipe shop. Second row (left) receiver or metal mixer attached to the MBC cupola. Its purpose is to "iron out" any possible change in composition, and (right) mechanized plant at Conduites d'Eau. Bottom row (left) Duplex moulding machine with turnover table by the Swiss firm of Metzer and (right) jobbing section served by a Sandslinger.

of eight to 10 tons per hour and two shifts are worked. One drawback is that the furnace has to be kept hot during the third shift.

Sand for the mechanized plant is supplied by a Bonvillain and Ronceray continuous sand plant. There is a wide variety of moulding machines available including Metzer (Swiss), Bonvillain and Ronceray, Zimmermann, Badische and Osborn. Sterling boxes are used in the mechanized section.

In the jobbing foundry, which makes castings up to 4 tons in weight, there is a modern Beardsley and Piper Sandslinger. Loam moulding is also much practised and large core-drying stoves are installed. The coreshop is well provided with modern plant. All patterns are made in the firm's own patternshop, but this was inadvertently—as so often happens—not included in the tour of the works. This department had made some excellent metal patterns for the production of heat-exchanger tubes. A special plant shown in Fig. 8 has been installed for their production. For shell moulding, a Polygram plant has been installed, but at the moment it is short of work.

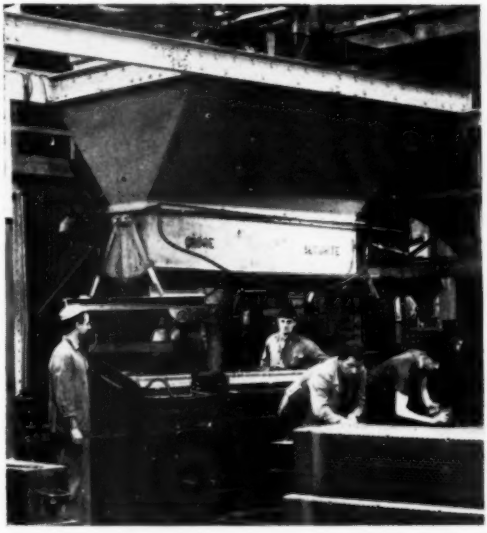


FIG. 8.—*Special plant installed at Conduites d'Eau for the manufacture of heat-exchanger tubes of which large quantities are made.*

FIG. 9.—*Section of the bronze foundry—using Fisher machines.*

FIG. 10.—*A large area of the floor of this shop is a grating through which the sand falls for reconditioning.*

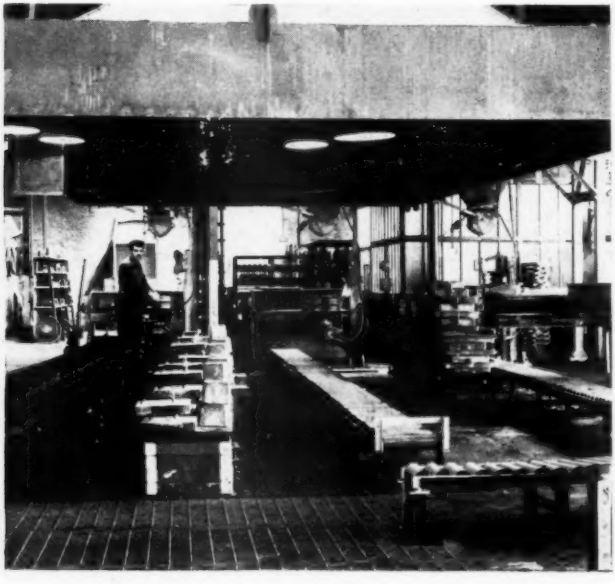


FIG. 11.—*The sand, after reconditioning, is fed back to the machine by a band conveyor.*

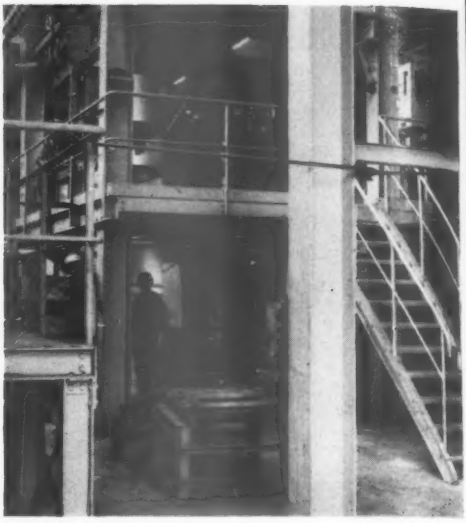


FIG. 12.—*Pilot plant devoted solely to cupola research.*

Brass and Bronze Foundry

The brass and bronze foundry is a very nice, well-equipped modest plant, which many foundries could emulate with advantage. In this foundry, about 40 different types of copper-based alloys are produced, in addition to a little aluminium work. Boxless moulds are made on Fisher Foundries Limited, machines (Fig. 9), which are giving every satisfaction. The moulds—70 half boxes per hour—are placed on roller conveyors. These are placed over a grilled area, shown in Fig. 10, and knocking-out allows the sand to form a considerable heap in the cellar. Here, fed by hand, gyratory riddles remove the major part of the spillings, whilst the sand passes to a simple sand-preparation plant which, using the normal system of conveyors (Fig. 11), fills the hoppers located over the moulding machines.

Much of the corework is carried out on a Shalco plant, together with a resin- and sand-mixing plant. A satisfactory test was made with an English premixed resin sand, but by the time transport was paid, the price was found to be uneconomical. Metal is furnished by two Morgan oil-fired crucible furnaces with a third as a stand-by and a small Sklenar furnace. In this section, there is a battery of home-made horizontal centrifugal casting machines. Meter cases castings made for the company's own shops are the main production of this foundry, but many other types of castings weighing up to about 1 cwt. are also in production.

Other Foundries

A steel foundry is in the course of erection and a converter is already installed. Electric furnaces are also to be installed. There is also another foundry at Çinez, 40 miles distant, which makes some 250 tons of iron castings per week.

Pilot Melting Plant

The pilot melting plant (shown in Fig. 12) is most interesting and, in the writer's experience, unique in the foundry industry. A self-contained building, containing an office, a workshop and the main laboratory houses this plant. Here is an experimental plant devoted to the development of the cupola. It is very fully instrumented for recording the results when using various types of fuels, refractories for lining, and so forth. All the metal made is teemed into a pig-

FIG. 13.—*Antique Helve hammer—one of the exhibits in the foundry museum of Conduites d'Eau.*

casting machine—an item in which this firm specializes. It is located against an outside wall and as soon as the metal is set, the pigs are automatically discharged outside the building.

The Doat family which for so many years has been connected with Conduites d'Eau, has taken great interest in the history and development of the foundry and, like the late Mr. John Every of Lewes, has created a magnificent museum in which firebacks figure very largely, but by no means entirely. Cooking vessels. pots and pans are also well represented, as well as an ancient rolling mill mainly constructed of wood and a weird helve hammer (Fig. 13) complete with a wooden water wheel. A most interesting exhibit is a reconstruction of an early gun foundry. This whole museum indeed is something which visitors to the forthcoming International Foundry Congress certainly must not miss seeing.

Finally, acknowledgment is made and gratitude expressed for the many courtesies extended to the writer by the *directeur*, Mr. Robert Doat, and to Mr. Winandy, the ironfoundry superintendent, who acted as chaperon during the tour of the works.

Broken Hill Output and Profits

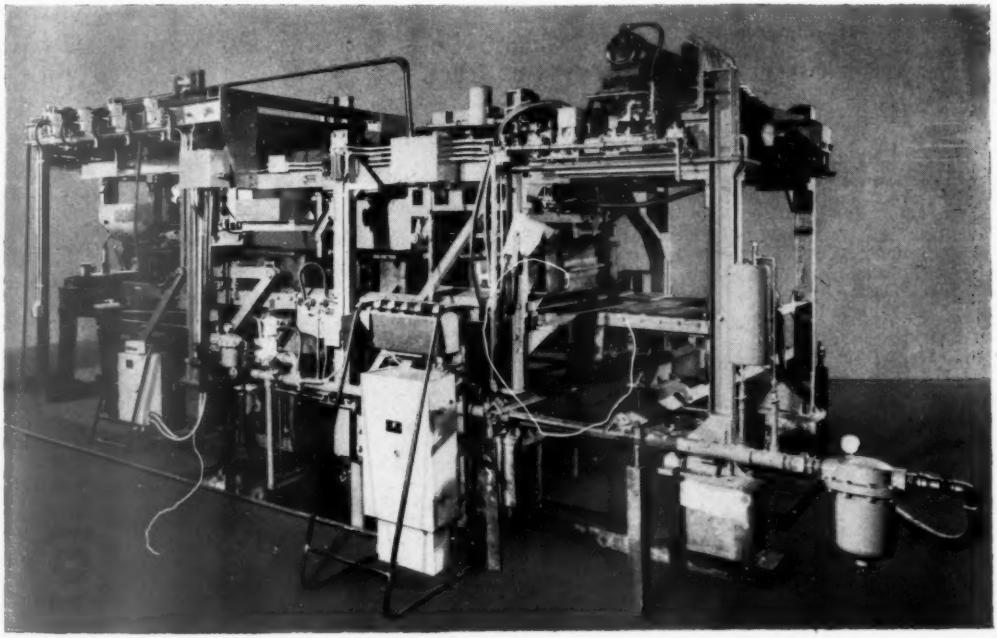
Another record has been set up by the Broken Hill Proprietary Company, Limited, Australian steelmakers, ironfounders, and colliery owners. The combined tonnage of steel ingots produced for the year ended May 31, 1958, was 2,965,488 tons, 10 per cent. higher than the previous year's record. Output of pig-iron also reached a new record. While there are signs of an easing in demand for certain products, principally heavy rails, structural sections, and plates, Australian sales overall were well maintained and the company had no difficulty in selling its record production.

In the annual report the directors state that the consolidated accounts reflect the substantial profit derived from export sales, but because the present world demand for steel and prices obtainable have fallen considerably, current export sales have been substantially reduced.

The consolidated net profit of £A9,072,842 was also a record. This was after appropriating £A6,120,000 towards additional costs of replacing plant and compares with a previous profit of £A7,267,010 after setting aside £A4,145,000 for additional plant replacement. The profit is stated after tax up from £A9,598,569 to £A11,496,966 and a depreciation allowance of £A10,125,015 (£A7,864,513). Dividends total 9¼ (10) per cent. of which the 4¼ per cent. final was on a capital increased by a scrip issue of 22⅜ per cent.

Coleman-Wallwork Automatic Moulder

The machine illustrated below is one of a pair completed by the Coleman-Wallwork Company, Limited, for despatch to Russia. Complete with a drag-mould turnover and transfer unit, it is designed for fully automatic mould-production sequences at the rate of 300 half-moulds per hour. The empty box (or flask) enters on a conveyor at the right-hand side and passes through the machine to receive a weighed quantity of sand. Next, the mould is rammed, the pattern stripped, inverted and deposited on a second moving conveyor (left-hand side). The machine will produce half-moulds up to a maximum size of 36 by 24 by 15 in.



Where Do They Go?

In response to frequent enquiries as to the ultimate destination of the very wide assortment of iron castings produced annually in this country, the following table is reproduced, from the statistics kindly provided by the Council of Ironfoundry Associations. It covers the period from 1952 to 1957 inclusive (earlier figures of a comparable nature were published in the JOURNAL, July 31, 1952, p. 130). The table indicates the main trends of production over the whole period.

TABLE 1.—*Iron Castings Production According to Use.* (*Thousand Tons.*)

Iron and Steel Board Form No. C90 Ref. Nos. (since 1954).	Main fields of consumption.	1952.	1953.	1954.	1955.	1956.	1957.
2, 9, 13	Building and municipal (pipes, gutters, manhole covers, baths, sanitary goods)	271.8	293.8	301.6	316.0	324.6	331.7
3, 4, 5, 6, 7	Cooking and heating apparatus, including radiators	239.6	223.7	230.3	225.3	197.7	193.2
11	Other domestic appliances	12.9	10.8	13.1	11.4	9.7	12.4
1	Pipes and fittings for gas, water, sewage, etc.	627.4	683.3	710.5	702.6	684.3	531.6
20	Coal mining	66.9	61.0	60.6	38.8	39.7	37.6
23	Gas and chemical plant	62.6*	55.6	52.8*	47.2	47.2	43.7
21, 22	Electricity generation and distribution	107.1	80.8	85.8	102.6	118.7	130.6
30, 31	Motor car and cycle industry (excluding tractors)	289.2	271.3	316.0	363.2	344.5	364.0
34, 35, 36, 37, 38	Railway equipment	349.9	328.6	311.3	278.9	313.4	344.5
14, 15	Shipbuilding	113.5	103.8	95.3	80.7	84.2	76.8
16, 17	Prime movers (turbines, engines) for land use	132.7	98.6	104.8	95.9	92.2	79.4
19	Boiler house plant for industry, etc.	76.0	63.9	60.7	54.8	54.1	49.6
25, 29	Agriculture (including tractors)	194.1	162.1	204.2	228.7	165.5	203.1
27	Machine tools	217.7	182.7	178.1	203.4	221.6	204.4
24	Textile machinery	144.5	107.2	118.9	135.7	121.4	101.2
18, 42	Valves, pumps and compressors	88.6	70.9	70.8	88.0	97.2	93.5
40	Ingot moulds for steel and non-ferrous metal manufacture	322.7	374.4	352.1	378.3	429.6	434.4
32, 33, 41	Iron and steel works plant and rolls for mills	137.4	131.2	121.9	129.2	147.0	162.4
39	Cranes and conveyors for industry, transport, etc.	40.3	37.5	39.3	50.2	57.0	54.2
28	Printing and paper machinery	28.1	22.8	25.7	31.3	33.0	33.9
8, 10, 12, 26, 43	Other fields	307.6	274.3	288.7	362.9	316.6	232.9
44	TOTALS	3,830.7	3,638.4	3,742.5	3,925.1	3,899.2	3,715.1

* These totals include castings previously returned under the headings of "Gas Production" and "Chemical Plant."

The Dragon sells British Equipment

Quasi-Arc Limited, the Bilston (Staffs), welding firm, have increased their sales of electrodes in China by adopting a new red dragon symbol. The difficulty of putting over the name "Quasi-Arc" in Chinese is one which has occupied the attention of the firm's associate company in China, British Oxygen (Hong Kong), Limited, for some time. Although the name is readily understood in any country which has a Western language based upon Roman characters, it could not be understood by the Chinese people. Initially, a name was devised which presented the phonetic sounds "Quasi-Arc" and which had an appropriate meaning in Chinese. It was discovered, however, that as a result of the large number of dialects which are spoken throughout the country, the new name did not stimulate sales to any great extent. In view of this, it was abandoned and the new symbol substituted.

New Blast-furnace for Stanton Ironworks

A new blast furnace—the only one of its kind in the country—was brought into operation last week at the Stanton Ironworks Company, Limited, Ilkeston (Derbyshire). The furnace is expected to burn for three years and to produce more than 300 tons of iron a day.

It is designed to prevent molten metal from penetrating downwards into its foundations, which, a spokesman of the company said, was one of the present-day problems of blast-furnace operation.

The furnace was lit by Miss Sally King, the 15-year-old daughter of the company's general manager in charge of services, Mr. J. E. A. King.

Record Output by W. G. Allen (Tipton)

In spite of the fact that output for 1957-58 was a record, the board of W. G. Allen & Sons (Tipton), Limited, colliery, light railway, and mechanical engineers, etc., of Tipton (Staffs), is disappointed that the final group results are not quite as good as they had hoped. This is stated by the chairman, Mr. A. Dyson, in his report.

The net profit of the parent company showed a substantial increase and those of Flexaire, Limited, and of the Lawrence Engineering Company compared favourably with the previous year, but from the total of these profits a loss of approximately £14,000 on the Package Heater Company, Limited, has had to be written off, so that the final figure is only a little above the previous year. The board hopes to report a more satisfactory position of the Package Heater Company next year.

Norwegian Contract for Aluminium

Believed to be one of the largest business agreements to have been made in Norway, a long-term contract was signed in Oslo last week between Aluminium Union, a subsidiary of the Canadian company, Aluminium, Limited, and A/S Aardal og Sunndal Verk, concerning the supply of alumina, against payment in aluminium metal.

The contract covers the delivery of a quantity of about 4,000,000 *tonnes* of alumina worth about 2,000,000,000 Norwegian kronor at to-day's prices.

THE BOARD OF TRADE is staging a small display about Britain's atomic power industry at the St. Erik's Fair, which is being held in Stockholm (closing, September 14).

Survey of Belgian Foundries, II.

Fabrique Nationale D'Armes de Guerre, S.A., Herstal

It might be assumed from its name that the Fabrique Nationale D'Armes de Guerre, S.A. of Herstal is a state-owned concern, but this is not so—it is a fine example of private enterprise. The company was formed in 1889 *by a group of Liège gunsmiths, following upon the receipt of a large Government order for rifles. To-day, it employs about* 11,000 *people and has branches at Zutendale and Bruges. Apart from munitions, it makes lorries, trolley buses, carbide-tipped tools, farm implements and aero engines. It operates foundries making grey and malleable iron, light alloys and magnesium and employs in these departments about* 200 *men and two or three women as coremakers. In what follows, the patternshop, iron foundry, malleable iron foundry, the facilities for alloy casting and the fettling shop are described and illustrated. (This establishment is to be visited during the International Foundry Congress.)*

Social Services

Each person entering the services of the Fabrique Nationale D'Armes de Guerre, S.A., at Herstal, Belgium, is given an illustrated booklet telling them something of the history of the concern, its current manufactures, hours of working, and the social services provided. The last are of a high order and include, for the foundry workers, full bathing and changing facilities and a refectory—in the latter, however, a full canteen service is not given, there being no demand for it. Soup and coffee—the Belgian equivalent of tea—are served. The refectory is pleasantly decorated and is a very comfortable room. The social services include the provision of a sports field for football and basket ball, and facilities for amateur theatricals and the like.

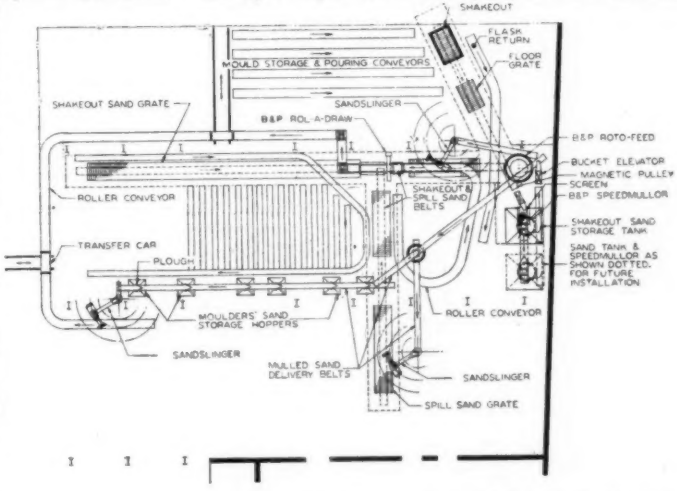


FIG. 1.—*Layout drawing of the ferrous foundry of Fabrique Nationale at Liège. Major components of the mechanized loop conveyor moulding unit and other mechanized facilities are shown.*

Patternshop

The patternshop employs about 25 skilled patternmakers. It is well equipped with Danckearts bandsaws, a Wadkin miller and a variety of French and German machines. The sawdust and chips are removed from the shop through floor openings, where they are carried away by suction for burning under boiler furnaces. Sawdust from the rifle factory is dealt with in a similar manner. The patternstores are located contiguous to the patternshop. The colouring of patterns is standardized internally and in general, would seem to conform to the national system. Only a few patterns are bought as so far the supply by master patternmakers is not highly developed.

Iron Foundry

For melting, there are two cupolas of much the same type as those functioning in British foundries. They give upwards of three tons per hour, increasing with the wear of the lining. High-carbon coke from Germany is used exclusively, except for lighting up, when the ordinary foundry coke is charged. Mr. J. Ophoven, the foundry manager, expressed his complete satisfaction with the new fuel. In use for melting malleable iron and low-carbon special irons are two 30-cwt. rotary furnaces, by Schmitz (Germany) and these are fired with anthracene oil. On the wall of the shop is a periscope for viewing the smoke from the furnace; this provides valuable information as to the metallurgical conduct of the furnaces. General views of the ironfoundry are shown in Figs. 1 and 2.

Bentonite bonded sand is used in the iron foundry. It is prepared in plant supplied by Fenwick S.A. of Paris and Liège. Sand from the knock-out and spill gratings reaches the sand plant by belt conveyor and passes beneath a magnet for extracting tramp iron; this magnet is supplied by Rapid Magnetic Machines, Limited. The sand is then taken up to

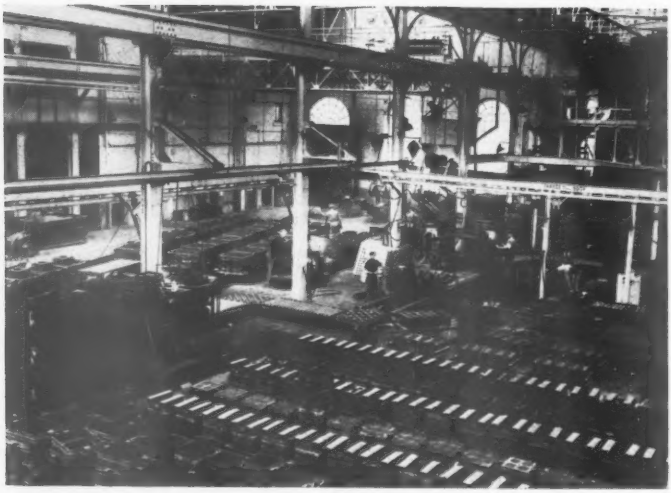


FIG. 2.—*General view of the iron foundry of Fabrique Nationale.*

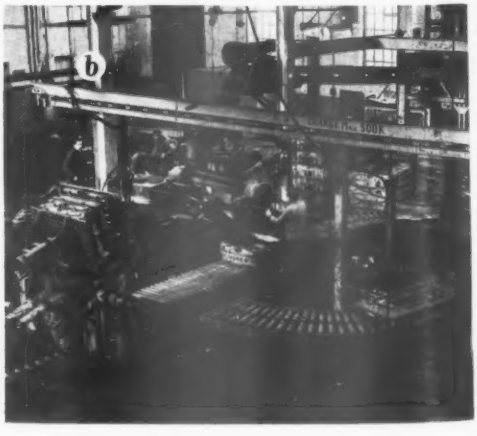
the storage hoppers by a belt-and-bucket elevator, where it is screened before entering the hoppers. From the base of the hoppers, sand is ploughed off into the mill, the additions of water and bentonite being carefully controlled. The mill used is a Beardsley and Piper sand muller and this, in addition to supplying a Sandslinger unit, also provides sand for a line of six moulding machines. A belt conveyor spans the line of moulding machines and adjustable ploughs control the filling of the moulders' hoppers. The first two of these have been fitted with vibrators which are giving good service, and are eliminating sticking.

As the moulding boxes (40 by 40 in.) are made in magnesium (Fig. 3(*a*)), the need for auxiliary lifting gear has been eliminated. The moulds are rolled over and the patterns stripped on a B. & P. Rol-A-Draw machine, made by Fenwick S.A. to American design (Fig. 3(*b*)), and move down a line of roller conveyors for coring up and closing. A further movement takes them to the pouring line at the end of which is the knock-out.

This system of mould making has much to commend it, for a much lowered capital cost is required and it can give a production not very far short of the highly-mechanized units, handling very easily a wide variety of patterns and box sizes. Elsewhere in the foundry and served by roller pathways is a second Sandslinger and a Sandrammer, the latter, illustrated in Fig. 3(*c*), is of British manufacture. These units use Sterling moulding boxes. On the line are two moulding machines by Zimmermann. The pouring ladles are dried by gas jets through openings in the wall.

Three types of cast iron are made: The first has a pearlitic structure with short lamellar graphite structure. Its composition is C. 3.0 to 3.4 per cent., of which 0.6 to 0.8 exists in the imbued condition: Si. 1.5 to 2.5; Mn. 0.6 to 1.0; S. 0.1 max. and P. 0.25 per cent. max. The second is a medium-phosphorus iron with 3.2 to 3.6 TC; 0.2 to 0.8 CC: Si. 1.5 to 2.5; Mn. 0.6 to 1.0; S. 0.1 max., and P. 0.5 to 1.0 per cent. max. A third, a high-duty iron, is also made carrying 0.15 to 0.35 titanium and 0.2 to 0.45 per cent. vanadium. Apart from having good mechanical strength (tensile.

FIG. 3.—(*a*) *By using* 40 *by* 40-*in. magnesium moulding boxes, handling difficulties have been eliminated.* (*b*) *A stripping and roll-over machine from part of the Sandslinger moulding system.*



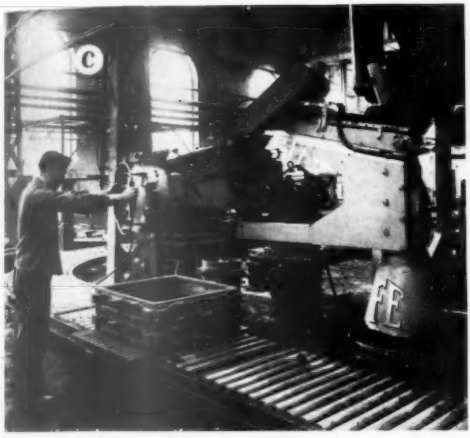


FIG. 3(*c*).—*Sandrammer* (*Foundry Equipment, Limited*) *installed in the foundry of Fabrique Nationale.*

transverse and shear), it has good wear-, heat-, and corrosion-resistance properties.

Malleable and Light Alloys

This foundry makes both blackheart and pearlitic malleable iron. Annealing is by electric resistance furnaces made by the well-known firm of Hendrex of Herstal, Charleroi. The cycle is of the order of 80 hr. for blackheart and 20 hr. for pearlitic. The blackheart material is of the following composition: T.C. 2.3 to 2.8; Si. 0.8 to 1.2; Mn 0.2 to 0.6; S. 0.05 max. and P. 0.1 per cent. max. The pearlitic-malleable iron is somewhat lower in carbon (2 to 2.4 per cent.), higher in Si. (1.4 to 1.8); much higher in Mn. (1.0 to 1.3), but has the same S and P. content.

This foundry casts alloys to about eight different specifications. Particularly impressive is the fume-extraction system for the town gas-fired Morgan pit fires, shown in Fig. 4. Hinged side doors and a hinged lid, each about 3-ft. square, with the back inclined somewhat, make fume extraction easy, as between the back wall and the top line of the lid there is a splayed piping leading directly into a main duct under suction. Coke-fired Morgan tilting furnaces are also in use, as a standby. The magnesium foundry also uses a Sandslinger for moulding, under licence from the Société Generale du Magnesium (Paris). Here, two alloys are made, one for general castings and the second, with Fe, Ni, and Cu kept down to the lowest limits, for cathodic protection purposes. Additional special alloys embodying the rare earths and zirconium are made under licence from Electron, Limited. Metal is melted in gas-fired pit furnaces furnished by Pierson of Paris.

Coremaking

The coreshop strongly resembles those currently seen in British foundries. Down the centre of the shop is a steel band conveyor, which terminates at the loading station for an Acme Junior vertical drying stove (Foundry and Engineering Company, Limited, West Bromwich). The CO_2 system is largely practised, but large-scale experiments are being made with shell-moulded cores. Many of the small cores are also made with Glyso and a Roper coreshooter is employed where large numbers of cores are called for. Racks are used for transporting cores to the foundry. The larger cores are made with air or quick-drying bonding material which is made locally. Here there are four core-stripping machines by British Moulding Machine Company, Limited.

Fettling Shop

The main plant in the fettling shop is a rotary-table shotblast machine, made by Fischer's of Schaffhausen—the table carrying within itself a series of smaller rotating tables. For larger castings, there is a shotblast room, which is operated from the outside. For cutting off runners and

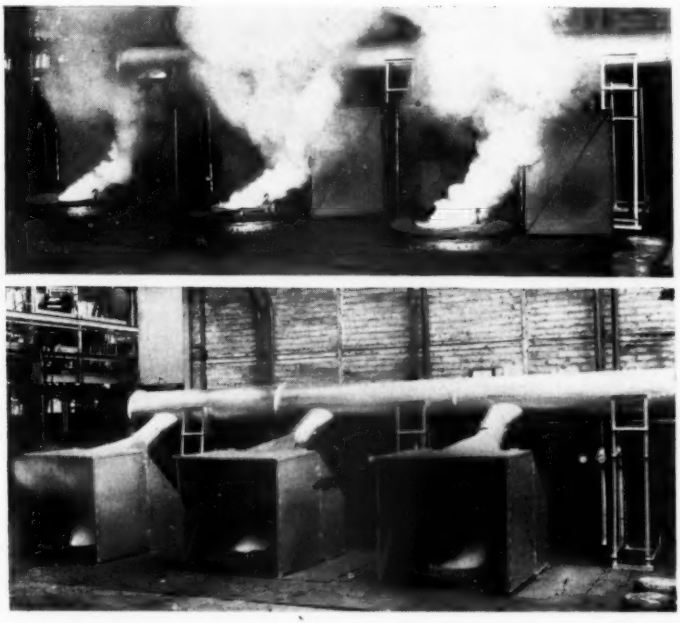


FIG. 4.—*Fume-extraction system for crucible furnaces. The lower illustration shows the hoods in use and in the upper the surrounds have been collapsed to permit crucible removal.*

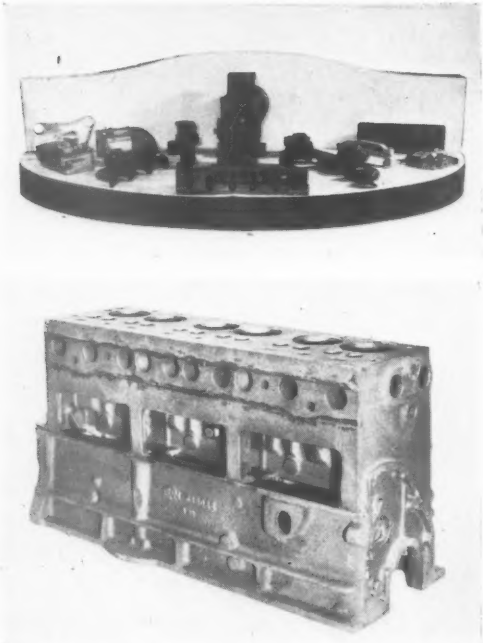


FIG. 5.—(*top*) *Group of typical castings from the Fabrique Nationale;* (*bottom*) *cylinder block of the kind produced in the foundry.*

feeders from the aluminium castings, a Midsaw (Midland Saw and Tool Company, Limited) has been installed. The atmosphere in the fettling shop is notably dust-free.

A Problem Solved

All foundries are faced with the problem of removing daily large quantities of "muck." This is accomplished simply and economically at the Fabrique Nationale. A double door, closed by roller shutters, allows a lorry carrying a cabin-operated rollover lifting tackle to back up to the foundry and deposit an 8 by 12 ft. empty shallow tray. Then the lorry manoeuvres to the adjacent door, picks and takes away a second full pan load to the disposal ground.

Conclusions

Obviously, such an organization as Fabrique Nationale possesses excellent research laboratories, but during the visit under review, time was insufficient for a visit to this department. A well-equipped and what is more important, a well-used sand-control laboratory was, however, seen in passing. The impression generally was that this foundry was better instrumented than most and that the castings made were of excellent quality (a selection is shown in Fig. 5).

Acknowledgments

Finally, thanks are due to Mr. Ophoven for his many courtesies and for the help he gave in the preparation of this article.

News from South Africa

Ferro-manganese Smelting Plant

A ferro-manganese smelting plant of the latest type is to be installed at the new industrial centre of Cato Ridge, Natal, by Feralloys, Limited, an associate company of Anglo-Transvaal Consolidated Investment Company, Limited. The essential element of the plant will be in the first instance, two covered, steel, rotating electric smelting furnaces manufactured by Elektrokemisk A/S of Oslo, Norway. The local agents are Samuel Osborn, Limited.

Many factors have influenced Feralloys in their choice of site. The relatively low South African rail tariff on ores and loading facilities at Durban made the choice of a site on rail near the coast patently necessary. Electricity, water and raw material sources were at hand, and the abundant water supply made the future production of steel a possibility. Finally, the adjacent African Reserve was a potential source of labour, this consideration being in accordance with the Government's declared policy of siting industries near the African areas.

The present project is not limited to the production of ferro-manganese. The immediate plans call for two furnaces which between them should, towards the end of 1959, begin to produce 100 to 120 tons of ferro-manganese per day, but there is ample provision for extension of manganese-smelting equipment and it is not improbable that the company's activities will be made to include the production of steel. Alternatively, the company might instal blast furnaces for the production of pig-iron.

Union Steel Corporation—A record production tonnage during 1957 is announced, the total despatches of all products during 1957 amounting to 147,000 tons of value £11.58 million pounds, according to the statement to the shareholders by Lt.-Col. K. Rood, chairman of the Union Steel Corporation of South Africa, Limited. The "B" open-hearth furnace at the Vaal works was rebuilt and enlarged and progress was made with a new 16-in. rolling mill.

South African Bentonite*

Last year, the clay laboratory of the National Chemical Research Laboratory received for the first time a clay sample that proved to be upon identification essentially a Ca/Mg montmorillonite. Further investigation showed that the deposit was extensive and the mineralogical composition unusually consistent. The chemical and physical properties of this montmorillonite were identical with those of the well-known Southern bentonites of the USA. It was also possible synthetically to alter this montmorillonite to have the properties of the famous Wyoming bentonite and actually it is stated that the altered South African montmorillonite showed superior properties as the bonding agent for foundry sands when compared with that from the American source. It should be possible to use this clay after various treatments to replace completely the imported bentonites in all their different commercial uses—an important development for South African industry.

Cast-iron Docking Blocks for Cape

James Brown, Limited, Durban, was recently successful in obtaining the contract for the side docking blocks to be used in a Naval Drydock situated in the Cape. A set of side blocks consist of four castings, the combined weight of which equals nearly 2½ tons. The total weight of castings involved is over 1,100 tons.

* Extract from "C.S.I.R. Research Review," June 1958. The product is now being mined, treated, and marketed in South Africa by G. & W. Industrial & Chemical Supplies (Pty.), Limited, Johannesburg, as "Ocean Bentonite," and is being used in several of the country's leading iron and steel foundries.

Mercury-arc Converters for Induction Heating

Recent developments in the application of grid control to mercury-arc rectifiers as an alternative to motor/generators as sources for high-frequency electric supplies are reviewed and discussed in relation to their application to high-frequency electric melting furnaces.

*By T. A. Cosh, B.Sc., A.R.C.S.T., F.I.M.**

For some thirty years, mercury-arc steel-tank rectifiers have been used to convert alternating current to direct current for many applications. In the same period, the application of high-frequency induction to the heating and melting of metals has been developed. For melting units of small capacity —up to 50 lb.—conversion to the high frequencies required has been made using spark-gap converters and high-vacuum valve oscillators. Normally, induction heating for units of larger capacity requiring high frequency has been carried out using motor/generator sets to convert alternating three-phase current at normal frequency to single phase at high frequency.

Some twelve years ago, the idea of applying grid control to a mercury-arc rectifier initiated the possibility of using the rectifier as a frequency changer, thereby producing an alternative to motor/generators as a source of high-frequency current. The original circuits for this conversion were not completely successful, but recent modification and developments carried out in this country have revived interest in a method for which a number of advantages over conventional motor/generator type induction units can be claimed:—

1. No special machinery foundations are required. All the equipment can be supported on a normal floor, thereby saving installation expense and facilitating any future reorganization which may be desired.
2. No air-conditioning is required for the electrical equipment.
3. There are no heavy moving parts requiring bearing maintenance.
4. There is absence of all noise and vibration, except frequency "whistle" common to all sets.
5. The electrical efficiency is greater at all loads, particularly (as shown in Fig. 1) at partial loads. Running costs are, therefore, less.
6. No capacitor switching is required. Changes in the characteristic of the load circuit are compensated for automatically.
7. Control is simple and more accurate and can be effected by either voltage or frequency control, both of which are provided.
8. Normally, a motor/generator set is kept running between heats, thereby consuming power. With the mercury-arc set, there is a saving of power and therefore reduced cost in this off-load period. This is important when operating continuously.
9. Fault finding can be effected at the control panel by means of the checking jack-plug and test meter provided on the instrument panel.
10. The overall capital cost is still less than for the motor/generator sets.

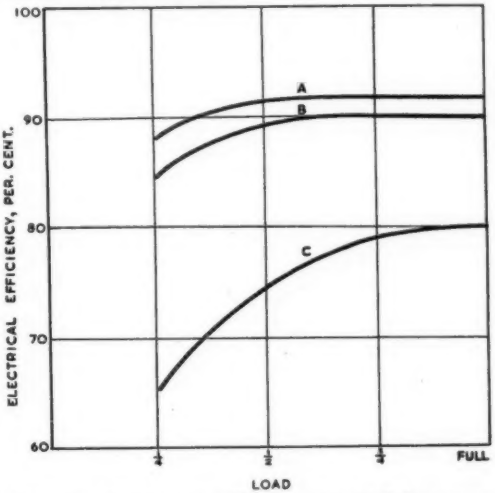


FIG. 1.—*Percentage efficiency of high-frequency generators: A—550-kw. mercury-arc rectifier type of frequency changer; B—200-kw. mercury-arc rectifier frequency changer, and C—typical motor/alternator set.*

Limitations of the Equipment

So far, as is known to the writer, only two inverters of the type and manufacture here described have been installed in the UK and only one of these is applied to a high-frequency melting unit (Figs. 4 and 5). It is too early to indicate with assurance the behaviour in practice—including maintenance—of these equipments. Neither of these two sets has operated for a sufficient length of time to indicate the life of a valve in service, although the manufacturers state that this should be in excess of five years, after which reconditioning may be necessary.

* The Author is head of steelmaking section of the British Steel Castings Research Association.

Mercury-arc Converters

Mainly due to the effect of the de-ionization time, there is at present an upper limit on the frequency of rectifier-frequency changing sets at present made in this country of 2,000 cycles per second. Although sets of larger capacity have been made in the USA,

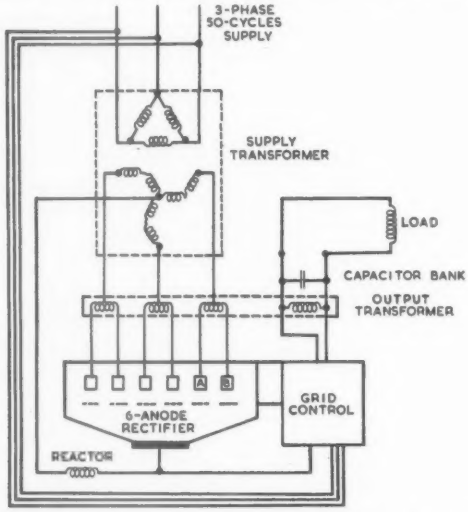


FIG. 2.—*Diagram of main connections for the mercury-arc rectifier frequency converter.*

no British-made installation has been built to operate at higher than 200 kw. Development work is at present being carried out in an attempt to eliminate these limitations, and so to widen the scope of this type of equipment to both smaller and larger capacity units.

Principle of Operation

A simplified diagram of the main components of a circuit which uses a mercury-arc rectifying valve as a frequency changer is shown in Fig. 2. The three centre-tapped primary windings of the output transformer are connected to each pair of anodes of a six-anode sealed-metal-tank rectifying valve, the cathode being returned to the supply transformer through a d.c. reactor. The output transformer is connected to the load coil and to the capacitor bank in parallel, the grid control also being coupled to the output circuit.

An oscillatory voltage is made to appear continuously across the load circuit, at a frequency determined by the frequency of the voltage on the control grids as follows: At any instant, the current flows from the supply-transformer phase (which is most positive with respect to cathode, through half of one primary of the output transformer), through one anode to the cathode of the rectifier and back through the reactor to the transformer neutral. This current, flowing in the output transformer causes a potential difference which charges the capacitor bank so that when the other anode of the pair is allowed to fire by making its grid control positive with respect to the cathode, the energy stored in the capacitor bank is available to cause the current to be transferred from the anode that was firing to this new anode. This process of transferring current between a pair of anodes is known as commutation and takes a definite time determined by the magnitude of the current and the reactance of the output transformer. The current is now flowing in the other half of the same output transformer primary-winding, with the result that, with the load-circuit voltage built up in the opposite direction, commutation to the original anode is assisted when the grid is again made positive. This procedure is repeated in turn for each of the other two phases of the supply current and each of the other two pairs of anodes in turn.

In the original circuits, the voltage on the control grids was derived directly from the output voltage through a suitable phase-shifting network forming a self-excited circuit. In the latest version, this has given way to a separately excited supply to the grids *via* an electronic oscillator. This has the advantage of giving definite control of the operating frequency at a pre-determined value.

Voltage Characteristics

The voltage waveform, taking the anode pair *A* and *B* of Fig. 2 as an example, is shown and described in Fig. 3. The time required for de-ionization (*t*) depends on the design of the anode

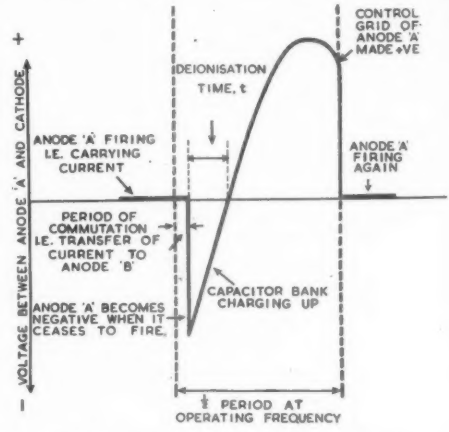

+
VOLTAGE BETWEEN ANODE 'A' AND CATHODE
-
CONTROL GRID OF ANODE 'A' MADE +VE
DEIONISATION TIME, t
ANODE 'A' FIRING I.E. CARRYING CURRENT
ANODE 'A' FIRING AGAIN
PERIOD OF COMMUTATION I.E. TRANSFER OF CURRENT TO ANODE 'B'
CAPACITOR BANK CHARGING UP
ANODE 'A' BECOMES NEGATIVE WHEN IT CEASES TO FIRE.
PERIOD AT OPERATING FREQUENCY

FIG. 3.—*Mercury-arc rectifier frequency converter anode-cathode voltage wave-form.*

assembly and the magnitude of the current that the anode has been carrying. There is, therefore, for equipment of a given rating, a minimum value of (*t*) below which oscillation will not take place. The waveform indicates that for a finite value of (*t*) the anode current leads the anode voltage by a definite

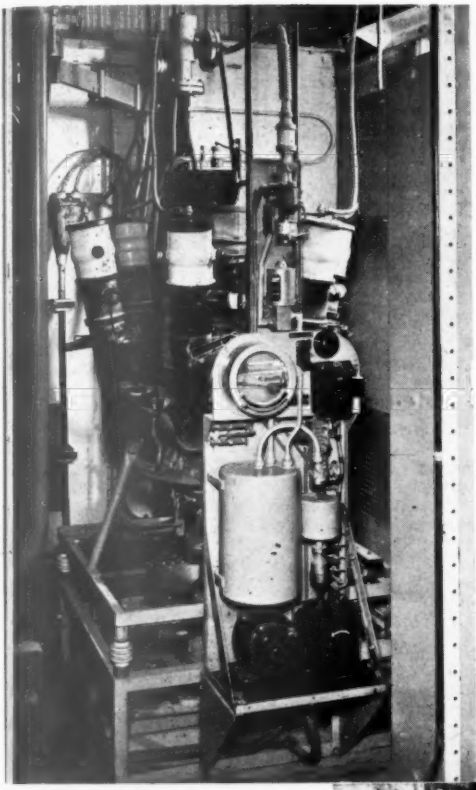


FIG. 4.—*Metal-tank rectifying valve.*

angle, which means that the current supplied to the load circuit from the output transformer must lead the output voltage by the same angle. The load circuit must, therefore, have a capacitive impedance, that is, it must operate at a frequency in excess of the natural resonant frequency. This imposes an upper limit on the operating frequency of a particular rectifier working with a particular current value. There is no lower limit to the operating frequency provided that the load circuit resonant frequency is also reduced to allow sufficient time for de-ionization to take place.

When the work in the load coil is heated, its resistance increases and in the case of steels which are magnetic at lower temperatures the permeability falls to unity at the Curie temperature. The resonant frequency of the load circuit, for a given capacitance, therefore varies during the heating period. In the case of a motor-alternator, which should preferably operate at a high power factor, switching in and out of sections of the capacitor bank is necessary during the heat. The rectifier equipment can, however, be made to adjust itself to these changes so that the value of the capacitor bank can remain unaltered during the heat. Despite the fact that the resonant frequency of the load changes and the angle of advance therefore changes, the output voltage is maintained constant by automatic variation of the instant at which one pair of anodes takes over from another.

Acknowledgment

Acknowledgment is made to the English Electric Company, Limited, for information on which Figs. 1, 2 and 3 are based and to G.W.B. Furnaces, Limited, for permission to reproduce Figs. 4 and 5.

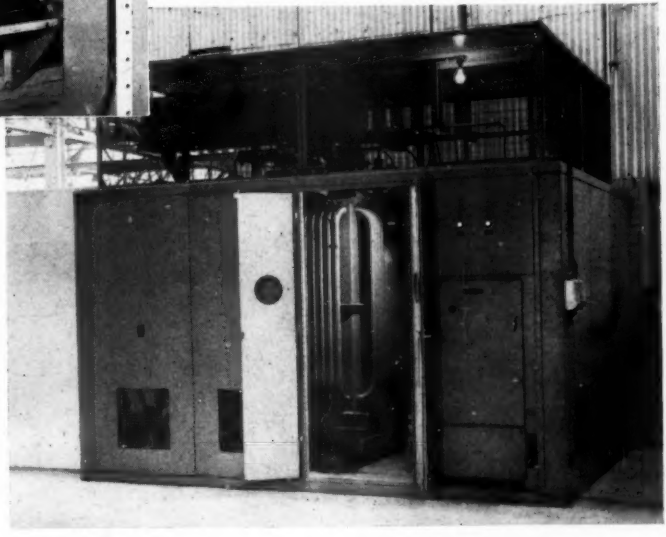


FIG. 5.—*General view of mercury-arc rectifier installation for a high-frequency electric furnace.*

SOME 600 WORKERS will be affected when the Balbardie Steelworks of the North British Steel Foundry, Limited, Bathgate, goes on a three-day week. A spokesman for the firm said that they had been trying to stave off the effects of the recession for some time, but there had been no improvement in the position.

THE Stockton-on-Tees marine and general engineers, Harker & Sons (Engineers), Limited, is to extend its Church Road premises. The work will include the construction of a new fabricating department, machine shop, and fitting shop. Since 1949, the firm has carried out extensions covering 26,000 sq. ft.

F

Equipment and Supplies

Multi-skip Dumper

Thwaites Engineering Company, Limited, of Cubbington, Near Leamington Spa, have designed a multi-purpose dumper to provide an entirely new method of bulk handling production materials, residues, wastes on the building site or inside the plant and factory. Interchangeable free-standing skips are associated with the multi-skip dumper giving one machine and one operator a versatility of a high order.

The dumper (Fig. 1) although having the outward appearance and compact size of the normal contractor's dumper has, by new design, extended its scope considerably. Briefly, it comprises a diesel-powered, wheeled mobile unit with a special hydraulically operated jib and wire rope which handles large numbers of loose skips. The machine not only controls precisely the lift tilt and discharge of the skips so that even liquids can be poured safely, but will recover the skip from 12 ft. or 6 ft. below ground level according to model.

Filing Machine

A further model of the Rindis powered disc-type filing machine, type RD 58/10 (Fig. 2) has been introduced to extend the firm's series. The machine is available as either a 10-in. bench model or pedestal machine and its maker is Lorant & Company, Limited, 98-100, Croydon Road, London, S.E.20. The gearbox has precision-cut gears and bearings for radial and thrust loads on the spindle and an inclinable worktable, which is adjustable towards the disc, has been provided. The complete unit is mounted on a substantial tray and the cover acts as a guard to the disc and also houses a rotary switch.

An important factor of the firm's filing discs are that they are double-sided and teeth extend to the periphery and are also incorporated on the periphery face itself when necessary. This facilitates the filing of work across the complete face or at the corners. These filing discs remove material four to six times faster than is possible by hand. Whatever arrangement of teeth be used, whether straight, curved or hand-cut, it is claimed that the discs operate without heat, abrasive or coolant; no clogging is experienced and shape is retained without redressing. When the cutting edges are dull, discs can be resharpened at a very small cost. A wide variety of teeth arrangement is available and ensures a maximum efficiency on many types of castings, such as those in aluminium and its alloys, Mazak, brass, copper, lead, etc. The disc design is such that thermoplastic and thermosetting plastics (patterns, for example) can be handled with ease. When using these machines, it is stated that waste material can be reclaimed, whereas the waste from grinding or linishing machines, which contains abrasive and foreign matter, is usually considered to be unusable. Two-speed models are offered as standard, but the machine can be supplied with any individual speed between 80 and 480 r.p.m. to suit the material being filed.

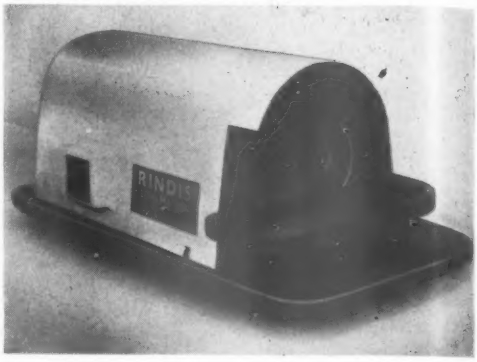


FIG. 2.—*Type RD 58/10 filing machine (bench model) made by Lorant & Company, Limited.*

Tube-cleaning Equipment

Vacu-Blast, Limited, Bath Road, Slough, Bucks, have developed and patented equipment and a technique for cleaning the internal surfaces of tubes and piping. It is claimed that a small range of simple attachments enables the cleaning of practically any shape or size of tube from ¼ in. bore upwards. The main part of the equipment is the Vacu-Blast machine itself. Incorporating a pressure/vacuum system for abrasive feed and recovery with a thorough segregation of grit slag and dust, the system lends itself to adaptation for tube cleaning which has been a recurring problem since the inception of industrial processes.

In effect the tube is used to replace the earlier type of gun with the pressure and vacuum hoses connected at opposite ends, the closed circuit being maintained within the tube body. According to the varying sizes of tube, different methods are employed.

FIG. 1.—*The multi-skip dumper is here seen lifting a filled skip of steel scrap preparatory to moving off, whilst the empty skip is filled by magnet crane.*

Babbitting of Cast Iron

Development of Improved Preparatory Methods at Phosphor Bronze Company, Limited

The Kolene Process, utilizing a combination of electrical, chemical, and physical effects, has been applied for the preparation of cast iron and other surfaces for lining with white metal. The Phosphor Bronze Company, Limited, of Birmingham, has laid down and is now operating new plant that incorporates this method of preparation of bearing backs or halves; together with centrifugal lining machines capable of handling bearings up to 20-in. o.d., and what follows is an account of its salient features.*

Cast iron is regarded as a notoriously "greasy" metal by those who have had to prepare it for tinning. The explanation is well known: namely the presence of carbon in the form of graphite dispersed throughout the crystalline structure of the ferrite/pearlite. The obstacles against providing a chemically clean and continuous surface for "tinning"—the initial stage in preparing a casting to receive Babbitt metal to make a bearing—can be overcome by the adoption of the Kolene Process. In this the workpiece is immersed in a series of baths of which the first contains Kolene 4, a salt of patented formulation. At the temperature maintained in the bath, the salt solution has a viscosity lower than water. The workpiece and the heated bath are given opposing electrical charges from a source of direct current, and at first the work is negatively charged to produce reducing members in the bath. Sand is dissolved from castings; scale, rust and other oxides are also removed, the low-viscosity molten salt penetrating every microscopic crevice.

Alternating Treatments

After the necessary period of reduction treatment has elapsed—the timing sequence obviously varies with the nature, intricacy, and size of the workpiece—the polarity of the workpiece and of the bath are reversed, to promote oxidation. The oxidizing removes graphite, grease, and other organic matter. Reference to the photomicrograph, Fig. 1, shows that the graphite removal extends far below the surface. The random distribution of the graphite in the cast iron, and the penetration of metal during tinning at several angles, has exceptional significance in the metalling process that follows the cleaning process. It is clear that the tinning metal flows into and fills the cavities left by the oxidation of graphite from the surface, and provides the perfect "key" for the white metal above.

After the oxidation phase, however, the cleaning process is not yet complete, in that a further period of reduction is necessary to convert oxidation products; thorough rinsing then follows, to remove all

* See FOUNDRY TRADE JOURNAL, May, 17, 1951 p. 529 *et seq.* and July 12, 1956. p. 59.

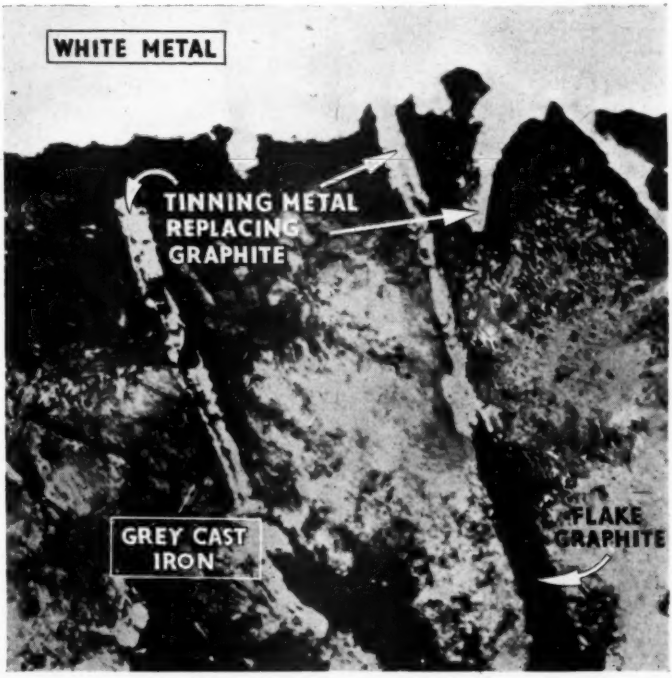


FIG. 1.—*Photomicrograph of a bearing, sectioned to show replacement of graphite by tin which has filled the voids caused by oxidation during the Kolene Process.* (×500)

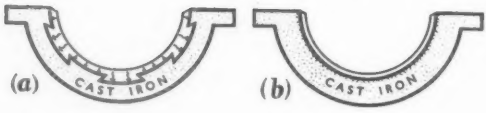


FIG. 2.—*Diagram showing (a) the variable dissipation of heat from a grooved bearing, and (b) fast, even dissipation of heat where there are no grooves.*

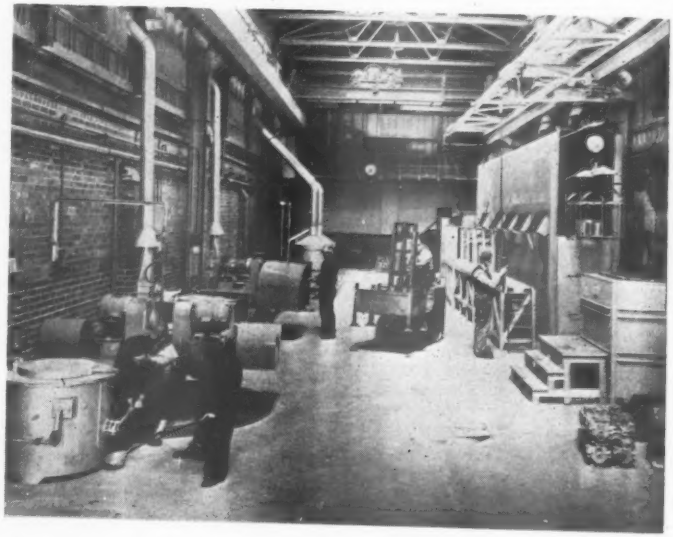
traces of the salt. Accordingly the casting is removed from the salt bath after the second reduction-treatment, and placed in a succession of washing baths from which it finally emerges dry and chemically clean, for metalling.

Variety of Alloys

Preparation of cast-iron bearing halves has been given prominence in this article because, it is believed, the process is a method of producing completely clean surfaces with a guarantee of 100 per cent. reliability. In fact, the Phosphor Bronze Company, Limited, is so confident of the keying effect in cast iron, that they have abolished the machining of reverse-taper keys into the metalled faces of C.I. bearing halves (Fig. 2). On the contrary, the firm's technicians now advocate plain, unrelieved surfaces, because the provision of relatively thick, wedge-shaped sections of white metal in a keyed bearing leads to inefficient and unequal dissipation of heat. Thin lining sections, given the new, more intimate junction with the cast-iron base, produce faster heat conduction and dissipation.

At the new bearing metalling installation at the Phosphor Bronze Company's works (Figs. 3 and 4) bearing halves up to 20-in. o.d. have the white metal run into them under centrifugal action, to produce dense and even linings. Water cooling is applied during the metalling process, to increase the density even further as desired. Larger bearings are gravity poured, but special techniques are used.

Drawing on a practical experience of bearing metalling, the company is now offering bearings of much enhanced performance for steel rolling mills, large diesel engines, heavy electrical equipment, and for other applications where working conditions demand peak performance and maximum reliability. The new metalling shop is equipped to handle bearings up to 6 tons in weight.



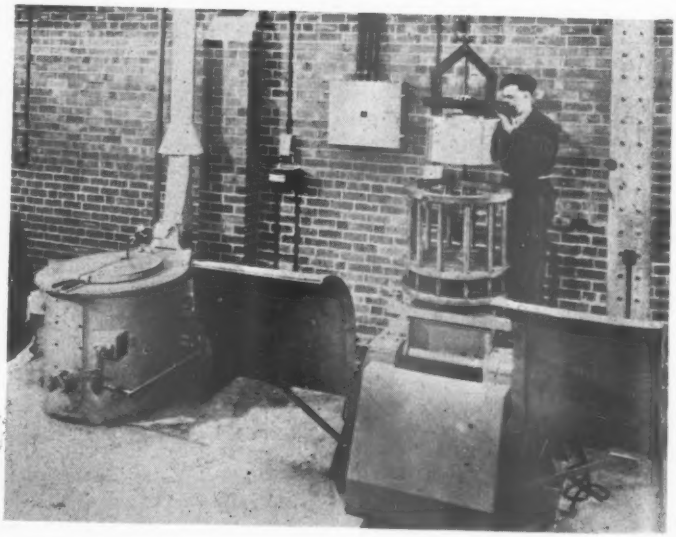


FIG. 3.—*General view of the plant used for Babbitting at Phosphor Bronze Company, Limited. The tin bath is on the extreme right and the white-metal furnaces and centrifugal lining machines on left-hand side.*

FIG. 4.—*Tinned bearing being lowered into the bearing holder of centrifugal lining machine; for this operation, the bearing holder is in a vertical position. Thermostatically - c o n t rolled, white-metal melting furnaces are shown on the left.*

Standards for Resin-coated Sand

By F. Le Serve

The consumption of resin-coated sand in this country is increasing steadily, the sand being used in many large and small foundries, in mechanized foundries and even in some jobbing foundries. This article is an attempt to help foundries to set a standard for their resin-coated sand, which is essential for continuous successful application. It must be appreciated that a standard cannot be set by testing a current batch of material which is behaving satisfactorily, but must be based on tests carried out over a period long enough to include several deliveries or batches made, notice being taken of shell performance, both in making and casting, and, of course, of the casting itself.

To give details of all the available tests for shell-moulding materials would require a paper of considerable length, and as details of these tests are readily available this note intends only to mention the normally accepted tests and briefly to discuss their various merits. A summary is also given of research work to date, carried out to investigate shell cracking.

Mechanical Grading Test

The mechanical grading test is of great importance as it can explain or even forecast changes in the casting finish and also any increase or decrease in shell strength.* The accepted standard grading test involves the use of about nine sieves and thus much time is spent finding the individual weights. To keep a reasonably close check on sand grading this test can be speeded up by using only two sieves. The top sieve is that which retains the coarse fraction of the sand, and for shell moulding sands this will usually mean the 60 or 44 B.S.S. sieve, and in the case of a very fine sand the 100 B.S.S. sieve. The other sieve will be the 150 B.S.S. or again for a fine sand, the 200 B.S.S. It is the amount passing this second sieve which is of importance for close control as it is this fraction which, having a large surface area, mainly determines the resin content necessary to give adequate shell strength.

Loss on Ignition

As a control test loss on ignition yields little of value but it is useful as a test for differentiating between grades having different resin contents. If a new resin is being tried it will give an indication of its solids content and this in turn will indicate whether any change in the quantity of gas evolved on casting can be expected. It must be pointed out here, that resins can vary tremendously with regard to shell strength and if a foundry is purchasing its resin-coated sand, it should be known whether the supplier sets his standard by strength or by resin content. The former is to be preferred.

Tensile or Transverse-strength Test

The tensile or transverse-strength test is the obvious one for the control of resin-coated sand as two variables, sand and resin, are being tested together. Thus, if this test falls below the required limits the aforementioned two tests should explain why. Obviously strength-test figures will vary widely, dependent on the method used for making and breaking the test-piece.

Experience has shown that the following points are of importance when establishing a strength test:—

(1) The coated sand, for making the test-pieces, should be completely free from aggregates, as these produce a wide variation in density, which, of course, has a marked effect on the strength.

(2) Care must be taken in the preparation of test-pieces with regard to keeping to a minimum any segregation between fine and coarse grains, if the sand grading tends to give such, as again this can seriously effect the strength.

(3) As far as curing the test-pieces is concerned, experience indicates that under-curing has a more severe effect on the cold strength than over-curing to within wide limits.

(4) A slow and steady rate of load on the breaking machine is essential for consistent results.

There are several methods available for producing and breaking test-pieces, each having its own advantages and disadvantages, hence no specific mention will be made of any one test.

Other Factors Involved

The tests referred to earlier are to ensure the production of shells to the required standard, but it is doubtful whether they will, except in extreme cases such as very low strengths, predict shell cracking or bursting when pouring takes place. Much work has been carried out to try and establish a test or tests on resin-coated sand which will correlate directly with foundry performance on casting.

The relevant properties might be assumed to be strength, thermal expansion, thermal conductivity and elasticity. Within wide limits strength seems to be not strictly relevant. Thermal expansion measurement have shown that cured shells come within the class of materials which tend to crack if subjected to thermal shock. However, the range of expansion is not great enough to suggest that variations in this property are of primary importance in cracking considerations, although there is some indication that shells cured within a certain temperature range have larger expansion coefficients than shells cured at higher or lower temperatures. No measurements of thermal conductivity have been made.

At ambient temperatures shells are elastic bodies

* The Author is attached to the foundry laboratory of British Industrial Sand, Limited.

Standards for Resin-coated Sand

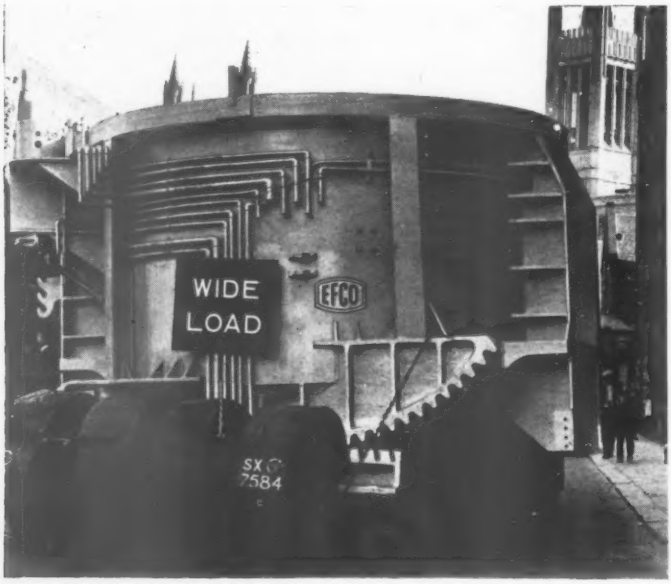
but somewhere between 150 and 250 deg. C. they become plastic. The temperature at which softening begins is higher, the higher the curing temperature is for a given resin, but there is a variation from one resin to another. Softening always takes place below the curing temperature. Once the softening temperature has been exceeded the transverse strength falls practically to zero, although tensile tests carried out at 300 deg. C. have shown a tensile strength about 50 to 60 per cent. of the original cold strength for most resins.

However, these findings remain merely indicative, and so far it has not been possible to correlate the laboratory tests with performance in the foundry. The difficulty in doing so resides mainly in the great diversity of casting conditions encountered.

In conclusion it is hoped that this note will encourage the foundryman to become more fully acquainted with the properties of resin-coated sand. Only from such acquaintance will he be able to choose the sand grading and resin content necessary to maintain a high rate of production of quality castings.

THE BRITISH TRANSPORT COMMISSION has placed an order with South Wales Switchgear, Limited, Blackwood (Mon), for 266 sets of 6.25 kv switchgear equipment needed for electrification programmes on the Eastern Region of British Railways.

Efco Export to Canada. *The illustration below shows the body of an Efco electric steel-melting furnace on the way to Aberdeen docks. Destined for Vancouver, B.C., the weight involved is about* 100 *tons.*



Changes in Export Licensing Control*

Following the announcement of relaxations in the list of goods subject to embargo when exported to the Soviet block and China, the Board of Trade has made the Export of Goods (Control) (Amendment No. 3) Order, 1958, which came into operation on Monday. Export control is imposed on a few goods for the first time, but in the main, the Order removes export control from a wide range of goods. Control has been imposed on the following:— Aircraft turbine engine fuel, certain fluorinated silicone materials, certain liquid polymers, boron carbide, boron nitride, diethylenetriamine, and vibration testing apparatus.

Control has been lifted completely from the following:—

Glass, certain plastics materials and siloxanes, certain types of aluminium and alloys and powder, carbonyl iron powder, molybdenum carbides, API pipes and tubes, certain types of wire rope, vacuum pumps, certain types of wire and strip of copper and copper alloys; apparatus for removing surplus stock from work-pieces; water lubricated bearings, diamond tools, dies, and abrasives, dredging equipment, floating docks, oil well apparatus, steelworks plant (control being retained on certain types of rolling mills).

Dielectric paper tissue, synthetic rubber, tyres other than aircraft tyres, nylon parachute cloth, railway vehicles, soil compactors, turbines, balances, crystals of lithium or calcium fluoride, temperature sensitive resistors, valve voltmeters, optical curve generators, pH apparatus, railway signalling apparatus, spectrographic instruments and apparatus, barium nitrate, crude coal tar, cumene, dinitrotoluene, ethylbenzene, furfuryl alcohol, glycols and their derivatives, hexamine, mono-Methylaniline, isopropyl ether, tetrahydrofurfuryl alcohol, titanium carbide, and diamond powder.

Amendments have been made to restrict the application of export control to a much narrower range of articles within the following general descriptions:—

Iron and steel, metals and alloys (control of cobalt and germanium has been relaxed to certain destinations), ball bearings, marine boilers, etc., chemical and petroleum plant and equipment, compressors, blowers, and fans, furnaces, machinery for the manufacture of electronic vacuum tubes or valves, metal working machines, machine-tool parts and accessories, metal cutting and woodworking tools, oil well drilling apparatus and tools, turbine locomotives, diesel engines, measuring and counting apparatus, microscopes, electrical machinery, X-ray apparatus, and molybdenum compounds.

In addition, due to the easier supply position, the opportunity is taken to free from control to all destinations the export of certain steel plates.

* SI 1958 No. 1417, price 5d. (by post 7d.), H.M. Stationery Office.

Robert Harlow & Son's Anniversary

Family's 225 Years in Brassfounding

One-hundred-and-twenty-five years ago, in 1833, Robert Harlow founded a business in Stockport to manufacture cocks and valves and all kinds of brass fittings. He came from Ashbourne, Derbyshire, and brought with him a hundred-year-old tradition of brassfounding and craftsmanship in clockmaking. The first Harlow to enter the industry was Joseph, born in 1704, who learned clockmaking and brassfounding in Birmingham and established a business there and in Ashbourne. His son Samuel inherited and developed the two businesses and became the greatest of the Harlow clockmakers. The Harlow family continued their crafts under Samuel's son Robert, until his death in 1828, when they passed to the next generation in Benjamin, Robert's eldest son. Following Benjamin's early death, his mother and brother ran the business until 1851 when it passed into other hands.

It is to Stockport and Samuel's grandson, Robert "the younger," that one must turn to find the name of Harlow still in brass. Born in 1811, he learned his craft in his youth and at 22 migrated to Stockport where he settled, and established his business. Between 1833 and 1855 he became known as a brassfounder, ironfounder and as a gas-and-water engineer. He made at least one well-known clock—that of Stockport Infirmary. From the beginning, a wide range of cocks for use with steam, water and spirits, gas cocks and fittings of all kinds was made, together with whistles, varieties of bells, lamps and pumps, a range of brass goods to individual requirements, and ironwork . . . and always valves. The type and range of the latter increased gradually until in the 1850's and 1860's the range included many of the models still manufactured to-day.

More-recent History

In 1855, Robert moved to larger premises in Wellington Road North, where the firm has remained with some further expansion until the present day. Robert was still known in his other capacities and as a heating engineer, but the clock-room had disappeared and valves became much more prominent in importance amongst the firm's products. He was a progressive man, interested in new inventions, and himself patented whistles, boilers, steam-traps, gauges, etc. He supplied goods to the local market and, increasingly, to the national market, exporting also to the Continent and to India. Some customers and suppliers who traded with Robert are still doing business (100 years later) with the present-day firm.

When Robert died in 1878, three trustees, including Robert's eldest son, ran the business until the youngest son, Bernhard, entered the firm in 1884 and it was under Bernhard's direction that the firm continued until 1942. Over the years until 1920, Bernhard extended the works buildings and elaborated many departments. The firm made valves and cocks in greater quantities and varieties but continued also many of the traditional products—with the addition, during the Great War, of munitions. In 1917, the title Robert Harlow & Son was formally adopted, and after the war Bernhard was joined in the business by his son Frank. In 1936, the firm became a private limited-liability company, with Bernhard and Frank as directors.

Early in world war II, Bernhard died, and the full burden of keeping the company at maximum wartime production fell on the shoulders of Frank and was one cause, no doubt, of his sudden and unexpected death in 1946. Another grandson of Robert, Mr. C. F. Budenberg, together with Mr. Hopwood and Mr. Pendergast from the works staff, became directors of the company and made it possible ultimately for it to continue as a family business under the management of another generation of the Harlow family in Frank's son, Donald Francis Harlow, who entered the firm in 1951.

So Robert Harlow & Son, Limited, completes its century and a quarter of foundrywork. The Harlow family can claim over 200 years in brass-founding and 125 years in the present business. In that time, changes have been many. The firm is proud of its past but with its foundations and experience so firmly rooted it is able to face the challenge of the future with confidence.

Provisional arrangements for the firm's celebration of its anniversary include the publication of a new catalogue, giving details of over 3,000 products including non-ferrous, cast-iron and steel valves, cocks and allied pipeline fittings, boiler mountings, etc., the publication of a new price list, and the publication of a history of the company (a 10,000-word booklet).

"Open Day" and Trip

On September 5, the 140 employees of the company "at home" at the works in Wellington Road North, Stockport, will be pleased to welcome anyone who would be interested in looking round. The works will be open during the afternoon and guides will be available from the staff to answer questions. It will be possible for visitors to see the non-ferrous foundry, coreshop and machine-shops, including the capstan, valve-fitting and brassfinishing departments. On display will be some of the firm's exhibits to be shown at the Engineering, Marine, Welding and Nuclear Energy Exhibition. It is hoped also that there will be present representatives from four generations of the Harlow family.

Over 100 employees and company pensioners have accepted the invitation of the company to a works trip starting from Stockport late on Friday, September 5. The trip will cover 550 miles by coach and train and will take 30 hours in all—to Edinburgh and Loch Katrine. With other guests there will be about 140 people altogether taking part.

Iron-ore Imports

Iron-ore imports in July, and the totals for the first seven monhts of this year and last, are shown below.

From	Month ended July 31.	Seven months ended July 31.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Sierra Leone	44,060	433,243	449,979
Canada	338,431	1,199,099	1,130,251
Other Commonwealth countries and Eire	78	9,396	2,397
Sweden	303,594	2,263,699	2,035,807
Norway	25,193	134,375	185,273
Western Germany	98	17	5,116
France	41,272	370,779	310,410
Portugal	6,800	79,300	82,117
Spain	47,060	648,746	414,150
Algeria	87,941	870,885	946,916
French West Africa	8,750	385,948	266,069
Tunisia	47,085	467,948	381,878
Northern Morocco	10,770	144,456	98,218
Southern Morocco	22,774	218,895	252,225
Liberia	25,720	224,368	196,745
Venezuela	124,212	664,714	972,154
Brazil	22,800	387,025	346,826
Other foreign countries	27,781	55,722	163,109
TOTAL	1,184,419	8,558,615	8,239,640

News in Brief

FOR THE FIRST SIX MONTHS of this year, the Sierra Leone Development Company has exported 758,355 tons of iron ore as compared with 749,400 tons for the similar period last year.

THE PUBLIC WORKS AND MUNICIPAL SERVICES congress and exhibition is to be held at Olympia, London, from November 10 to 15. At least 35 of the 400 exhibitors who will be participating, operate furnaces.

THE ATOMIC ENERGY AUTHORITY, Risley, has placed an order with Wild-Barfield Electric Furnaces, Limited, Watford, for two 100-lb. arc melting vacuum furnaces of the cold mould type. They will be used for consumable and non-consumable melting.

BROOK MOTORS, LIMITED, announce the formation of a Canadian subsidiary company, titled Brook Electric Motors of Canada, Limited. The offices of the company are at 250, University Avenue, Toronto, and business will commence there on October 1.

AITON & COMPANY, LIMITED, pipework engineers, Derby, have secured contracts valued at several hundreds of thousands of pounds, for boiler and pipework at two new power stations, one in Buenos Aires, and the other at Thorpe Marsh, near Doncaster.

AMONGST THE FIRMS which have applied to the Nigerian Government for relief from customs duties is the West African Aluminium Foundry, 9, King George V Road, Lagos. They make name-plates, road signs and other castings in aluminium and bronze.

THE BUSINESS in marine electrical equipment of Laurence Scott & Electromotors, Limited, is being handled from more convenient offices in the Liverpool area. The new address is 5, Rumford Place, Liverpool, 3. The telephone number remains the same (Central 1114).

AMONG THE SPEAKERS and officials at a conference with the theme "1958—A Year of Challenge," organized by the Advertising Clubs of Great Britain and Ireland, to be held in Harrogate from September 19 to 21, is Mr. W. T. Wren, chairman of Allied Ironfounders, Limited.

B. O. MORRIS, LIMITED, Morrisflex Works, Briton Road, Coventry, have been appointed sole agents in this country for Macolaepp handlaps, wheels and paste which are of German origin. A catalogue (List ZG.4) has been prepared setting out the potentialities of the new range of abrasion tools and materials.

THE SCIENTIFIC FILM ASSOCIATION has moved to new offices in 3, Belgrave Square, S.W.1. These premises have been made available by ASLIB and it is anticipated that this closer relationship will introduce the work of the Scientific Flm Association to many who are concerned with documented information of all kinds.

HARTLEY'S MALLEABLE FITTINGS COMPANY, LIMITED, of Copley (Yorks), are embarking on a two-stage development programme aimed at increasing production. The first stage, involving alterations in the finishing departments will, it is hoped, be completed by the end of the year. The whole development is expected to take two years, involving moving the main production centres, erection of a new building and the installation of new plant.

THE FIRST BATCH of 31 British diesel dump trucks, ordered by the Public Works Department of Brunei from Leyland Motors, Limited, are now working in the Borneo jungle on the Tuetong road-construction project linking Brunei Town and Kuala Belait. Placed through Henry Waugh & Company, Limited, of Kuching, Sarawak, the orders cover 28 Leyland Comet dumpers and 3 Leyland Beaver dumpers, all complete with bodies.

UNITED STEEL COMPANIES, LIMITED, which employs 36,000 people and were amongst the first to introduce a contributory pension scheme in the steel industry over 20 years ago, are to make a 50 per cent. increase in benefits payable under existing schemes without raising employee contributions. The new arrangements take effect on October 4, and the cost to the company will be £200,000 a year for the next 11 years and over £100,000 a year thereafter.

IMPERIAL CHEMICAL INDUSTRIES, LIMITED, Metals Division, is to establish the first plant in Europe for the production of wrought beryllium. The plant is designed to produce semi-fabricated forms of the metal, such as rod, tube and plate, and finished machined parts. Its first task will be the execution of a production-scale contract placed with ICI by the United Kingdom Atomic Energy Authority (Industrial Group) as part of a nuclear development project. Subsequent spare capacity may find additional outlets for this unusual metal, as for example in the aircraft industry.

WHILE ON A VISIT TO LONDON recently, Mr. Sigfrid von Weiher took the opportunity of visiting the Siemens Edison Swan Factory at Woolwich. Mr. von Weiher is associated with the Siemens Museum in Munich and is engaged in collecting historical material and data of the activities of the German electrical organization, Siemens and Halske A.G. He was entertained at Woolwich by Mr. Newbold, the works manager, and was later taken on a tour of inspection of the older buildings in the factory that were part of the early history of Siemens Brothers, some of which date from 1863.

WILD-BARFIELD ELECTRIC FURNACES, LIMITED, Elecfurn Works, Otterspool Way, Watford By-pass, Watford, Herts, announce that as a result of their development of standardization of heat-treatment appliances, a number of furnaces ranging from the laboratory and toolroom muffles to medium-size batch furnaces are available ex-stock. Delivery of many of the larger equipments and salt-baths for toolroom and production purposes is only a matter of a few weeks, standard parts being made up and stocked ready for assembly into the size of furnace required.

THE FEDERATION OF BRITISH INDUSTRIES has entrusted George Cohen Sons & Company, Limited, with the disposal of the British Industry Pavilion which has already attracted 4,000,000 sightseers at the Brussels Exhibition and won universal acclaim as a masterpiece of modern structural engineering. The main Pavilion is completely walled with mirror-plate glass. It has a floor area of 60,000 sq. ft., entirely unobstructed except for the six main stanchions which support the whole structure. It is understood that already Holland and Belgium are competing for the Pavilion but it is hoped that, like the Crystal Palace in its day, this unique building may be re-erected at some worthy site in Britain, where it can continue to serve the interests of British Industry.

No "Grace" for Grit! In contradiction of what was printed on page 267 of last week's JOURNAL (when reviewing the FBI "Guide to the Clean Air Act"), it has been pointed out that the "temporary exemptions" mentioned therein relate only to dark smoke. The Act does not provide any temporary defences for the emission of grit and dust.

Publications Received

Steel To-day—Expansion and Efficiency. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

This eight-page leaflet could usefully be placed in the hands of everybody entitled to vote, as it presents an irrefutable argument against State ownership of the steel industry. In 20 short sections, it discloses the enormous progress that has been made in the last few years, the great economies achieved, and the planned programme for expansion. If ever there was a case for "let well alone" it is that of the iron and steel industry.

Un Siècle de Développement de la Production d'Acier. (A century of steel production.) Published by the European Coal and Steel Community, Luxembourg.

Statistics can be made interesting and this 30-page brochure has succeeded in this respect, because it has extrapolated curves derived from the figures of various tables—yet such extrapolation as a basis for forward planning can be fraught with danger. In all cases, the outputs of the Community countries are lumped together and thus the continuance of the *Haute Authorité* is assumed.

Nationalization, by E. Rubin. Published by De Vero Books, 35, Buckland Crescent, London, N.W.3; price 2s. 6d.

The author of this booklet regards State ownership of industries as a first step in the direction of dictatorship of the proletariat and has, throughout this 12-page pamphlet, used the countries behind the iron curtain as the basis for his arguments, which are logical and reasonable. The illustrations used are such as should appeal to the average trade unionist. As a piece of unofficial potential propaganda the booklet has much merit.

Annuario A.I.M. (Yearbook) 1957. Published by the *Associazione Italiana di Metallurgia*, 16, Via Moscova, Milan, Italy.

The Italian metallurgical association was founded in 1946, and has made such progress that it now has nearly 2,000 members.

This yearbook is invaluable to firms doing business with the Italian foundry industry. It contains a library list; the names of all the members; lists of iron and steel works; rolling mills and foundries. The last carries indications as to the type of metal cast. Naturally, the bye-laws are included.

British Standards Institution. Annual Report, 1957-8. Published by the Institution from 2, Park Street, London, W.1; price 7s. 6d.

The Report takes 272 pages to cover the Institution's activities. Over 60 pages are necessary to deal with international standards, and a further 90 pages are devoted to listing the personnel of BSI committees. The information disclosed is very useful to executives whose duties involve standardization.

THE YORKSHIRE ENGINE COMPANY have despatched a 31-ton diesel electric locomotive which they have made for British-Houston Company, Limited, to Durgapur, West Bengal, India. At Durgapur it will work on the site of the steelworks being constructed. The engine was hoisted on to the cargo ship S.S. Masirah at Birkenhead on August 26.

You can't go wrong with Sifbronze!

Says Will the Welder.

As far as I'm concerned, Sifbronze welding has one big advantage—it's low temperature application. That makes it quicker and easier to use, and I always find it gives the strongest weld.

There are thirty-one different rods in the S.I.F. range—so you'll always find one for the job in hand. There's no doubt about it—you can't go wrong with Sifbronze!

If you're not yet using Sifbronze I recommend you write at once for details to:—

SUFFOLK IRON FOUNDRY (1920) LIMITED,
STOWMARKET SUFFOLK. TELEPHONE: STOWMARKET 183.

ANGLOY

Our NEWEST NOZZLE

Is for Direct Connection to the Rubber Hose.

TUNGSTEN CARBIDE LINED—
Like all the other 'Angloy' Nozzles

ASK FOR TYPE "H"

ANGLARDIA LTD., Adelphi Ironworks, SALFORD, 3.

Personal

Mr. ROBERT G. EDWARDS has been appointed to the board of the Indian Iron and Steel Company in place of Mr. JAMES L. ESPLEN who has resigned.

Dr. J. S. MCPETRIE has been appointed Director-General of Electronics Research and Development, Ministry of Supply, in succession to Dr. D. H. BLACK.

Mr. G. N. VANSITTART has been appointed a director of R. H. Neal & Company, Limited. He will retire as chairman of Vauxhall Motors, Limited, at the end of this month.

From October 1, Mr. ARTHUR SHILLAM of Tree Tops, King's Grove, Bingley, will join the Sandiron House group of companies, as technical sales representative for the West Riding area.

Mr. THOMAS V. BAINES has been appointed consulting geologist to the International Nickel Company of Canada, in Africa. Mr. Baines has been associated with the company since 1951.

Mr. H. J. SHELLEY, C.B., Chief Inspector for Further Education (Industry and Commerce), retired on August 31. He will be succeeded by Mr. C. R. ENGLISH, now Staff Inspector for Engineering. .

Mr. HARRY SKEET BROOM, chairman, Broom & Wade, Limited, High Wycombe, recently celebrated his 83rd birthday by holding a party to which the senior executives of the company were invited.

Mr. A. DYSON, chairman of W. G. Allen & Sons (Tipton), Limited, colliery, light engineering, and mechanical engineers, etc., of Tipton (Staffs), intends to retire as chairman after the annual meeting on September 23, but he will remain on the board. It is proposed to elect Mr. R. HAMPSHIRE as chairman.

Pyrene Company, Limited, Great West Road, Brentford, Middlesex, announce that Mr. W. L. BAKER, manager of the metal-finishing division, retired on September 1 after 30 years' service with the company. He is succeeded by Mr. H. A. HOLDEN, M.SC., A.R.C.S., D.I.C., who has had many years' experience in the division.

Mr. R. DUNCAN, deputy training officer of the British Iron and Steel Federation for the West Riding and North Derbyshire area, has been appointed training officer for the area, in succession to Mr. O. W. REYNOLDS, who has been appointed education and training officer at the Redbourn steelworks of Richard Thomas and Baldwin, Limited, at Scunthorpe.

Monsanto Chemicals, Limited, announce the appointment of Mr. D. C. M. SALT to the newly-created post of general manager in charge of chemicals division, and of Mr. G. DODD to the corresponding post of general manager in charge of plastics and special products division. Both general managers will be responsible to the managing director, Mr. D. R. MACKIE.

Mr. P. W. PERCY, for some time resident representative for F. Perkins, Limited, the Peterborough diesel engine manufacturers in Central America and the Caribbean, with headquarters in Jamaica, is in future to have his headquarters in the United States, and he will also represent in the Southern States F. Perkins (Canada), Limited, the Canadian subsidiary of the company.

Mr. N. S. BILLINGTON, M.SC., M.I.H.V.E., who has been head of the National College for Heating, Ventilating, Refrigeration and Fan Engineering since February 1950, resigned on August 31 to take up the appointment of director of the Heating and Ventilating Research Council. His successor is Dr. DAVID R. SCOTT, at present a senior lecturer on the staff of the Royal College of Science and Technology, Glasgow.

Mr. C. S. WILKINSON, at present manager of the Templeborough finishing banks at the Steel, Peech & Tozer branch of United Steel, will move from this appointment for attachment to the superintendent of rolling mills at the branch until the end of the year. On January 1, 1959, he will become manager of the Brinsworth Mill. Mr. E. RYDER became manager of the Templeborough finishing banks on August 1, with Mr. G. H. SAMBROOK as assistant manager.

Mr. W. G. PINDER, managing director of Crossley-Premier Engines, Limited, has been appointed to the board of the parent company, Crossley Brothers, Limited. Mr. HUGH BECK and Mr. JOHN L. PUGH, a director, and secretary and chief accountant respectively of Crossley Brothers, have been appointed to the board of Crossley-Premier Engines. Mr. JOHN SHIELS, assistant secretary of Crossley-Premier Engines, has been appointed secretary and chief accountant of that company.

Ashmore, Benson, Pease & Company, a member of the Power-Gas group, announce that Mr. G. B. TAYLOR has been appointed sales manager (works division) and Mr. D. A. CROOKS becomes foundry manager. Mr. Taylor joined the company in 1928. He was later appointed to the foundry as metallurgist and since 1938 he has been foundries' general manager. Mr. D. A. Crooks, who joined the company in 1931, has been responsible for the introduction of works-studies systems and foundry costing methods into the general foundry. In 1957 he was appointed foundry production manager.

Obituary

The death is announced of Mr. FRANCIS KEAN, who was employed by the International Harvester Company, Limited, for almost 40 years until his retirement last year. He was 65. He had worked at the company's factories in Russia, Germany, France, and Belgium. For 12 years he was works auditor at the Doncaster works.

The death took place on August 30 of Mr. JAMES MACLEOD, late of the MacLeod Steam Turbine Company, Limited, Glasgow. He was the inventor, in 1939, of the MacLeod geared-turbine unit, a compact system of steam propulsion. Mr. MacLeod was also associated with the late Sir Hugh Reid in pioneering the evolution of turbine locomotives.

Sir GUY LOCOCK, a vice-president of the Federation of British Industries and its director between 1932 and 1945, died on September 1. Sir Guy, who was 75, was for many years one of the leading authorities on trade and industry. He was a director of the Trade Indemnity Company, Limited, and a vice-chairman of Doulton & Company, Limited, makers of industrial porcelain and stoneware products, of London, S.E.1.

Changes of Name

Among companies which have recently changed their names are those listed below. The new names are given in parentheses.

BANSTEAD SHEET METAL WORKS, LIMITED, 31A, High Street, Sutton, Surrey (Banstead Enamelling Company, Limited).

USTRIMO ENGINEERING COMPANY, LIMITED, Moat Works, Kings Coughton, Alcester, Warwickshire (K.C. Clips, Limited).

CHARLES PURDEN, LIMITED, engineers, etc., of 48, Lancaster Street, Birmingham, 4 (Tittley, Son & Brickley, Limited).

ALLOY SURFACES, LIMITED, Central Hall Buildings, South Road, Southall, Middx (Metallic Surfaces Developments, Limited).

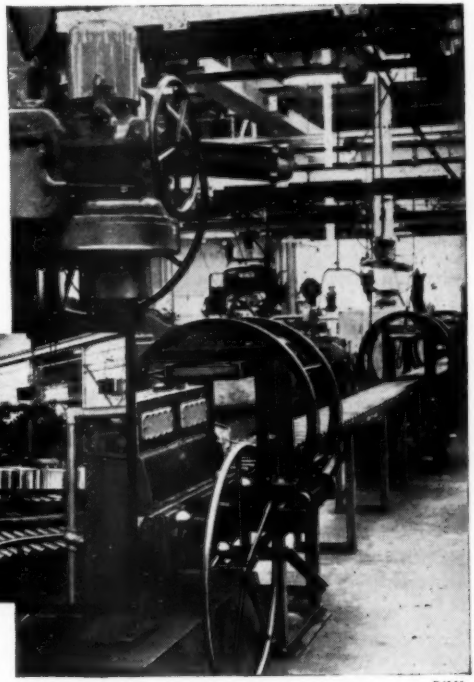
MORRIS & YEOMANS, LIMITED, Lighthouse Works, Riverside, Alcester, Warwickshire (Morris & Yeomans (Machine Parts), Limited).

production rolls along . . .

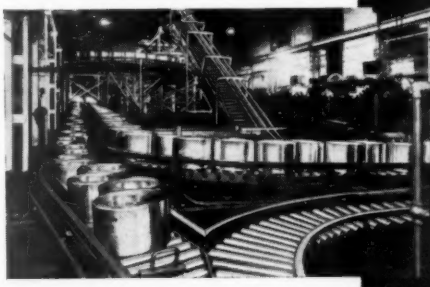
. . . when PANTIN conveyors speed the movement of materials and products. Shown here are two gravity roller conveyor installations in the motor and metal industries. All types of mechanical handling equipment is provided by PANTIN. Write for our fully illustrated catalogue.

PANTIN

ROLLER CONVEYORS



Suppliers of fork lifts and factory trucks electric or diesel



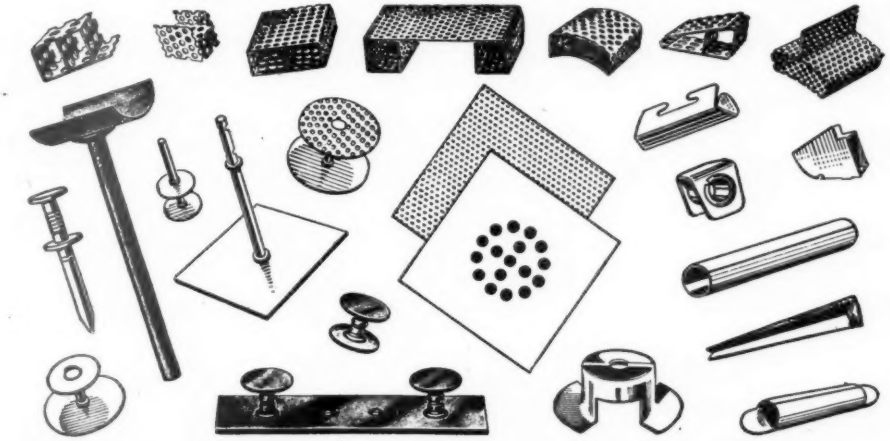
W. & C. PANTIN LTD CENTRE DRIVE EPPING ESSEX

TEL. EPPING 2271 ASSOCIATED COMPANY THE BRITISH MATHEW LTD

P4101

CHAPLETS & STUDS FOR EVERY BRANCH OF FOUNDRY INSDUSTRIES

WE ARE THE ORIGINAL MANUFACTURERS IN THIS COUNTRY WITH OVER 30 YEARS' EXPERIENCE



PRECISION PRESSWORK CO. LTD.

(PATENTEES)

CLIMAX WORKS, COLESHILL STREET, BIRMINGHAM 4, England

'Phone: Aston Cross 1402 Established 1874 'Grams: Precico. Phone, Birmingham

Company News

BAKER PERKINS, LIMITED, manufacturing engineers, iron, steel, and brass founders, of Peterborough—The company has acquired Yates Plant, Limited, designers and manufacturers of welding and manipulating equipment, at a price of £6,000.

WELLMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED—A one-for-one scrip issue, involving capitalization of £800,000, is proposed by the directors. It is stated that the proposals arise in part out of the revaluation of the company's Darlaston works. Proposals will be submitted at an extraordinary meeting which will follow the annual meeting on September 24.

PEASE & PARTNERS, LIMITED—Total output at the foundries during the year amounted to 15,942 tons, compared with 12,412 tons the previous year. Trading profits were much improved, but there has been a considerable falling-off in demand during the current year in respect of the requirements of the British Transport Commission, the principal customer of the company. Net profit is £17,648 (£3,765), after tax of £14,639 (£1,643).

RANSOMES & RAPIER, LIMITED, engineers and ironfounders, of Ipswich (Suffolk)—Invoicings during the year were 6.8 per cent. greater and export sales constituted about 43 per cent. of total turnover. The value of orders at the end of 1957 was much higher than at the end of 1956. After tax of £128,055 (£107,868), net profit was £96,617 (£96,523). The dividend is maintained at 7 per cent., tax free, on increased capital. The share capital was recently acquired by Newton, Chambers & Company, Limited, Thorncliffe.

W. H. DORMAN & COMPANY, LIMITED, manufacturing engineers, ironfounders, and diesel engine manufacturers, of Stafford—The forward order-book is beginning to "look healthier," states the chairman, Mr. D. Haddon, in his review covering the year ended March 31, 1958. Steps taken to strengthen and expand the selling organization throughout the world could not become effective soon enough to overcome the recession experienced during the year. Group net profit contracted sharply from £57,367 to £12,076 and the dividend is reduced from 12½ per cent. to 8½ per cent.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—Group trading profits, subject to tax and depreciation, amounted to £6,990,000 in the half year to June 30, 1958. This is £230,000 higher than for the corresponding six months of 1957 and £50,000 better than the previous half year's figure. Due to higher depreciation provision, the net trading profit, before tax, is slightly down, from £5,000,000 to £4,840,000, compared with the corresponding 1957 period. Orders received, mainly for delivery within three years, were £13,100,000 down compared with the end of 1957 and £4,300,000 less than at June 30, 1957. A second interim dividend of 2½ per cent. is declared on an increased capital, making 5 per cent. to date (same) in respect of 1958. The 1957 total was 15 per cent.

Bid for Stothert & Pitt Fails

It was announced on August 22, that the requisite number of acceptances of the recent offer by Spencer (Melksham), Limited, had not been received from shareholders of Stothert & Pitt, Limited, the Bath (Somerset) engineers and ironfounders, etc. The offer has therefore lapsed. The offer was opposed by the directors of Stothert & Pitt.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

796,947. Ideal Boilers and Radiators, Limited, Ideal Works, Hull.

Chaplet-positioning apparatus for use in foundry production. The invention has particular application to cast-iron radiator sections adapted for assembly into multi-sectional radiators for use in central-heating systems.

796,980. Licencia Talalmanyokat Ertekesito Vallalat, 10 Jozsef nador ter, Budapest, V, Hungary.

A process whereby the gas produced in "dead heads" during casting, can be obtained in a substantially predetermined quantity and can be fairly accurately regulated thereby reducing wastage to a minimum.

797,129. H. J. Daussan, 9 av. Leclerc de Hautecloque, Metz (Moselle), France.

A process and device for coating moulds in a particular manner. (Reference should also be made to Patent No. 785,824.)

797,339. Ford Motor Company, Limited, 88 Regent Street, London, W.1.

A process for rapidly and economically incorporating nitrogen as an alloying element in metals which are predominantly iron.

797,514. Rolls-Royce, Limited, Nightingale Road, Derby.

"Lost-wax" precision-casting process. A shell is formed around an expendable pattern made of a thermosetting resin which will not melt below 50 deg. C. To the pattern is applied successive coatings, each initially liquid, consisting of a thermosetting resin hardenable at a temperature below 50 deg. C. mixed with a comminuted refractory and an alkali phosphate. After each coating is applied, a powdered refractory is applied while the coating is still wet. The resin layers are allowed to harden by a method which does not cause the liquefaction of the pattern. The pattern is liquefied after at least one of the resin layers has been caused to harden. Finally, the shell is fired to decompose the resin and to cause the alkali phosphate to bind effectively the shell material.

797,579. Erico Products Inc., 2070 East 61st Place, Cleveland, 3, Ohio, USA.

A method and material for welding aluminium and other metals. The invention is particularly concerned with a cast/welding operation using molten metal produced by an exothermic reaction.

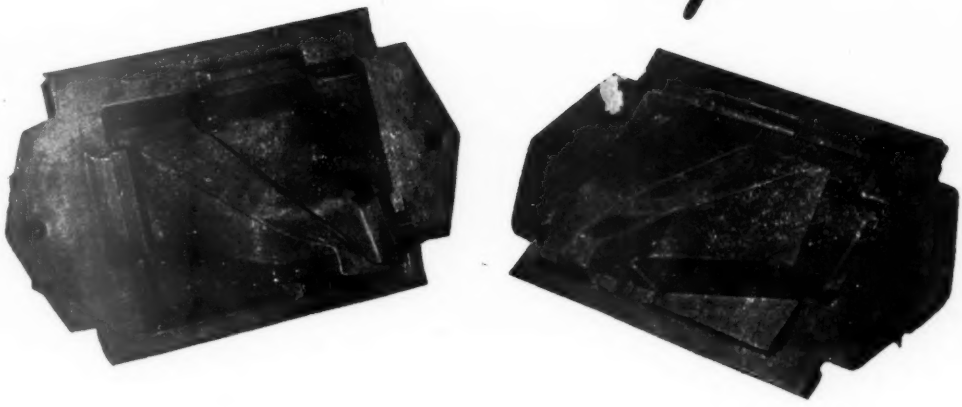
797,585. Constructional Engineering Company, Limited, Titan Works, Henry Street, Birmingham, 12.

An improved core-making machine. The particular claim made is that the sand is agitated by the tangentially entering air, and becomes intimately mixed with it.

THREE LEADING BRITISH ENGINEERING FIRMS, the Power-Gas Corporation, Limited, John Thompson, Limited, and Humphreys & Glasgow, Limited, announce that they have formed a new company, the Nuclear Chemical Plant, Limited. This firm will be concerned with the design and engineering of process and treatment plant for the nuclear industry.

UNBEATABLE!

PRESSURE CAST *by*



CROCKETT LOWE LIMITED

THE LATEST METHODS FOR THE FINEST PATTERNS *of course!*

Designers and Manufacturers of Pattern Equipment by Craftsmen who know every phase of Pattern Making and have practised it to its Finest Skill. Our DRAWING OFFICE FACILITIES, TECHNICAL CONSULTANT SERVICE, and above all SPECIALISED MACHINERY and MODERN EQUIPMENT assure maximum economy in every step of the procedure.

This is why leading manufacturers rely on us for the utmost accuracy, economy and production technique in Wood and Metal Pattern Equipment engineered to fit the needs of your foundry.

Expert Pattern Moulders in our own Foundry produce:— PRESSURE CAST COPE and DRAG PLATES, **SINGLE** AND DOUBLE SIDED MATCH PLATES in ALUMINIUM & BRONZE, SHELL MOULDED PATTERN EQUIPMENT. EPOXY RESIN AND ALL TYPES OF WOOD AND METAL PATTERN EQUIPMENT for the Engineering, Automobile, Aircraft, Electrical, Marine, Shipbuilding and Allied Trades.

PATTERN MAKERS TO BRITISH INDUSTRY

NUCLEAR HOUSE, SUMMER HILL STREET, BIRMINGHAM 1

Phone: CENtral 5371-2 GRAMS: NUCLEAR, B'HAM.

Raw Material Markets

Iron and Steel

Most of the foundries are now back at work, but find that orders have not accumulated at any appreciable rate; in the case of the light foundries, quiet conditions still prevail. The jobbing foundries anticipate an improvement in the early autumn and the foundries catering for the motor, heavy engineering, and machine-tool industries are also hoping that business will improve in the next month or two, although they have not felt the depression quite so much as the light foundries.

There are plentiful supplies of all grades of pig-iron; in fact, the stocks of hematite and high-phosphorus iron are extremely heavy, but even for low-phosphorus iron, for which the demand is reasonably good, makers cannot get rid of their present outputs and consequently have to stock. One Derbyshire furnace making high-phosphorus iron has closed down temporarily owing to the absence of business.

Ordinary scrap, suitable for the foundries, is in good supply, but special selected grades, such as cylinder blocks, etc., are scarce, and foundries would wish for largely increased supplies.

One or two re-rollers report a slight improvement in the demand for small sizes of bars, but, generally speaking, conditions remain quiet and the re-rollers could do with considerably more business than is at present forthcoming for their ordinary range of rounds, squares, flats, and light angle sections. They experience no difficulty in securing from home works all the billets they require, but owing to the state of trade they are keeping their stocks of these semis to as low a level as possible. Mills manufacturing semis could take on considerably more tonnage than is at present forthcoming.

No supplies are coming through from abroad, although offers of semis from the Continent have been received at prices which are lower than the home levels. Midland re-rollers are not able to compete with the Continent for export business, their price being considerably above the Belgian and German levels. From time to time they do receive business where Siemens Martin is specified as most of the offers from the Continent are for Thomas.

Non-ferrous Metals

Measures for restricting the import of Russian tin into this country were announced by the Board of Trade on Friday. As from last Saturday, imports of tin either originating in or sent from the Soviet block, including China, became subject to individual licensing. Russian imports are subject to a three-month quota of 750 tons, which compares with imports from the Soviet Union in the second quarter of this year of 2,090 tons, and in the first quarter of 1,362 tons. The Netherlands, the other principal importer of tin, has also agreed to impose restrictions on Soviet tin.

The UK Government's action follows a marked rise in sales of Russian tin in the world markets over the past 18 months. Soviet exports to the free world, which rose from 450 tons in 1956 to about 9,000 tons in 1957, were running at about double this rate in the first six months of this year. Tin prices were already coming under pressure before the Russian sales developed, largely as a result of the American recession and the general decline in industrial activity elsewhere. It was to deal with this situation that member countries of the international tin agreement last December decided to restrict imports. Since then producing countries have been restricting exports to a rate of about 60 per cent. of the previous normal level. In the closing quarter of this year these countries will be cutting back their exports even further to about 50 per cent. of the level before the imposition of the restrictions.

Continuation of Soviet sales had caused some concern, especially to many of the main producing countries—Malaya, Bolivia, Indonesia, the Belgian Congo, Thailand, and Nigeria. Several approaches were made to the Soviet Government by the chairman of the International Tin Council. Eventually, the Soviet Government agreed to send an observer to the council, but the general view was that this avoided the main problem.

Tin prices in London rose well above the buffer stock support level of £730 a ton following the Board of Trade's decision to restrict imports of the metal from the Soviet block.

The defeat of the US Minerals Subsidy Bill last week dealt the copper price a blow from which it has yet to recover. This is understandable in the context that it was due to hopes of the Bill being approved thus leading to the US stockpiling 150,000 tons of copper at prices up to 27½ cents a pound which triggered off the relatively recent improvement in the copper price structure. But a general look around at the present situation suggests that it is better than the sharp price fall reflects. The Soviet block and Chinese markets are now open; general demand, remembering that it is still holiday time, is far from disappointing; the US economy is supposedly on the mend; the labour situation in Rhodesia and in Chile is unsettled; and, international tension is such as to discourage complacency. There is, too, in the UK, at any rate, the encouraging feature of LME stocks being less than 12,000 tons at the end of last week.

Nevertheless, the immediate reaction to the House of Representatives killing the Seaton Bill has been the lowering of the US custom smelter price by another ¼ cent to 26 cents a pound. The primary producers' price is unchanged at 26½ cents a pound and is likely to remain so. With America climbing out of her economic trough on the wings of inflation, it is still difficult to believe that this latest swallow makes a summer.

Negotiations between the copper mining companies and the Northern Rhodesia Mine Workers' Union, concerning the 38 residual jobs which have been in dispute for several weeks, ended in deadlock on Thursday of last week. The number of jobs still in dispute was reduced to 22 as a result of the talks. The union announced that it would instruct its members to refuse to do any disputed tasks. The position is regarded as being very serious, with the prospect of the closing of the mines.

In lead, the rejection of the Minerals Subsidy Bill has led to a cut of 20 per cent. in the output of St. Josephs Lead. This will make a significant difference to overall production as St. Josephs Lead produced about 40 per cent. of the total US lead output last year. It has also led to the revival of rumours that President Eisenhower may now act on the report of the Tariff Commission brought out last April. In London the market has been continuously weak and it now transpires that it was the fall in the UK price which led to the unexpected cut in the New York spot price by ¼ cent to 10¼ cents a pound. This was due to fears that a flood of imported metal would result.

Zinc, though not in a healthy position, at least has been having its good days and, in contradistinction to lead, seems to be getting some benefit from the recent voluntary cutbacks in production.

THREE FILMS dealing with the European Community won silver medals on the third European Day at the 19th International Film Festival at Venice.

Say 'TACCONE'...

that's how quickly green sand squeezes into the shell moulding class

As quickly as you can say "Taccone"—in less than two seconds, in fact—the Taccone Diaform Moulding Machine squeezes green sand into a mould which is accuracy-test-proved to compare with shell moulding work. The Taccone's production depends entirely on the speed of the handling equipment provided.

This Machine gives

Uniform pressure over pattern surface, regardless of contour variation.
Consistent hardness throughout mould.
Complete control of casting dimensions.
Smooth action which cuts wear on pins, bolts, pin lifts and metal or wooden patterns.
No efficiency loss even during heavy duty.

Send the coupon or write to us

BAKER PERKINS *Engineers* LTD

FOUNDRY MACHINERY DIVISION, BEDEWELL WORKS, HEBBURN ON TYNE, CO. DURHAM. *Tele. Jarrow 89-7124*

for high production or jobbing foundries

Please send me information and your illustrated leaflet on the
'TACCONE' DIAFORM MOULDING MACHINE

Name..... *Status*.....

Address..... *Country*.....

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

September 3, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £47 0s. 0d. to £47 10s. 0d., scale 17s. 0d. per unit; 75 per cent. Si, £66 0s. 0d. to £66 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 6s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 9s. 6d. per b. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £83 10s. 0d. to £87 0s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £79 10s. 0d. to £85 0s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 0d. per lb. Cr; 1 per cent. C,* 2s. 0½d. per lb. Cr; 0.15 per cent. C,* 2s. 1½d. per lb. Cr; 0.10 per cent. C,* 2s. 1¾d. per lb. Cr; 0.06 per cent. C,* 2s. 2d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £78 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £206 0s. 0d. to £206 5s. 0d.; three months, £206 5s. 0d. to £206 10s. 0d.; settlement, £206 5s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 11⅛d. per lb.; rods, 216s. 0d. per cwt. basis; 20 s.w.g., 251s. 0d. per cwt.

Tin.—Cash, £733 0s. 0d. to £734 0s. 0d.; three months, £733 0s. 0d. to £734 0s. 0d.; settlement, £734 0s. 0d.

Lead (Refined Pig).—First half September, £71 5s. 0d. to £71 10s. 0d.; first half December, £72 5s. 0d. to £72 10s. 0d.

Zinc.—First half September, £64 10s 0d. t £64 15s. 0d.; first half December, £65 0s. 0d. to £65 5s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £98 17s. 6d.; rolled zinc (boiler plates), all English destinations, £96 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £85 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 7½d. per lb.; sheets to 10 w.g., 170s. 6d. per cwt.; wire, 2s. 4¾d.; rolled metal, 170s. 6d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £138; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £167; HTB2 (38 tons), —; HTB5 (48 tons),—.

Gunmetal.—BS1400, LG2 (85/5/5/5), £168; LG3 (86/7/5/2), £179; G1 (88/10/2/½), £238; (88/10/2/1), £228.

Phosphor Bronze.—BS1400, PB1 (AID released), £252 per ton.

Phosphor Bronze Strip, etc.—Strip, 253s. 6d. per cwt.; wire, 3s. 8½d. per lb.; rods, 3s. 0d.; tubes, 3s. 0d.; chill cast bars: solids 2s. 11¾d.; cored 3s. 0¾d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 7d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 11¾d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 10¾d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, —; AB2, —.